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Alaska Department of Fish and Game
Commercial Fisheries Management
and Development Division
P.O. Box 25526
Juneau, Alaska 99802-5526

December 1995

# Sonar Enumeration of Fall Chum Salmon on the Sheenjek River, 1988–1992

by

Louis H. Barton

State of Alaska | Tony Knowles, Governor

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## ABSTRACT

From 1988 through 1992 a single Bendix side-scanning sonar fish counter was used to estimate fall chum salmon *Oncorhynchus keta* escapement in the Sheenjek River, a second-order tributary of the Yukon River. Sonar-estimated escapements ranged from 40,866 chum salmon in 1988 to 86,496 in 1991. Escapement estimates based upon sonar have been conservative for the Sheenjek River, because counts do not include fish passing beyond the counting range, fish present before the sonar equipment was in operation, and fish present after counting ceased. Further, annual estimates may not always be strictly comparable among years depending upon project startup dates and duration.

Variations in water levels and velocities and behavior of Sheenjek River chum salmon migrating upstream had a pronounced effect upon the ability of the hydroacoustic equipment to accurately estimate salmon passage. However, this factor was addressed by adjusting fish passage estimates, as necessary, based upon daily calibrations of the hydroacoustic equipment. The sonar counting range was considered adequate for the detection of the majority of fish passing the sonar site because most were oriented nearshore. Upstream migration was primarily confined to periods of darkness with the period of greatest movement occurring on average between 2400 and 0600 hours (37%).

The minimum Sheenjek River escapement goal of 62,000 chum salmon in place from 1988 to 1990 was achieved only in 1989. A revised minimum goal of 64,000 chum salmon in place for 1991 and 1992 was achieved both years.

Based upon vertebrae collections, age-0.3 and -0.4 fish together composed between 94% and 99% of the annual chum salmon samples. Whereas age 0.3 predominated in all years except 1992, ranging from 60% to 77% during 1988–1991, age-0.3 fish represented just under 18% of the 1992 escapement.



KEY WORDS: Chum salmon, *Oncorhynchus keta*, sonar, hydroacoustics, escapement, enumeration, Yukon River, Porcupine River, Sheenjek River

## INTRODUCTION

Although five species of Pacific salmon *Oncorhynchus* are found in the Yukon River drainage, chum salmon *O. keta* are the most abundant and constitute the greatest inriver harvest. This species occurs in two distinct runs in the Yukon River: a summer (early) run and a fall (late) run. Fall chum salmon are larger, spawn later, and are less abundant than their summer chum counterpart. They primarily spawn in the upper portion of the drainage in streams that are spring-fed and usually remain ice-free during the winter. Major fall chum salmon spawning areas include the Tanana, Chandalar, and Porcupine River systems, as well as various streams in the Yukon Territory, Canada, including the mainstem Yukon River (Figure 1).

Fall chum salmon are in great demand commercially with harvests permitted along the entire mainstem river in Alaska as well as in the lower portion of the Tanana River. No commercial harvest is permitted in any other tributaries of the drainage, including the Koyukuk and Porcupine River systems. Commercial harvest also occurs in the Canadian portion of the Yukon River near Dawson. The majority of the commercial harvest occurs in the lower river downstream of the village of Anvik. Fall chum salmon use as a subsistence item is greatest throughout the upper river drainage, upstream of the village of Koyukuk. In some recent years estimated drainage-wide subsistence use has rivaled or exceeded the documented commercial harvest.

Although the Alaskan commercial fishery for Yukon River fall chum salmon developed in the early 1960s, annual harvest remained relatively low through the early to mid 1970s (JTC 1992). Estimated total inriver utilization (U.S. and Canada commercial and subsistence) of Yukon River fall chum salmon was below 300,000 fish per year prior to the mid 1970s (Table 1). However, inriver commercial fisheries became more fully developed during the late 1970s and early 1980s, and total utilization averaged 536,000 fish from 1979 to 1983. Harvest peaked in 1979 at 615,000 and in 1981 at 677,000 fish. Since the mid 1980s management strategies have been implemented to reduce commercial exploitation on fall chum stocks in order to improve poor escapements observed throughout the drainage during the early 1980s. In 1987 a complete closure of the commercial fall chum fishery occurred in the Alaskan portion of the drainage, and in 1992 commercial fishing in Alaska was restricted to only a portion of the Tanana River during the fall season.

During the period 1960 through 1980 only various segments of annual runs of Yukon River fall chum salmon were occasionally estimated from mark-and-recapture studies (Buklis and Barton 1984). Excluding these tagging studies and apart from aerial assessment of selected tributaries since the early 1970s, comprehensive enumeration studies were sporadic and limited to only two streams: the Fishing Branch River (Porcupine River drainage) and Delta River (Tanana River drainage). Comprehensive escapement enumeration studies have intensified on major spawning tributaries throughout the drainage during the past decade.

One of the most intensely studied fall chum spawning streams has been the Sheenjek River. Run timing and spawning abundance estimates were made annually on this river from 1981 through 1987 by the Alaska Department of Fish and Game (ADF&G) using hydroacoustic techniques (Barton 1982, 1983, 1984, 1985, 1986, 1987, 1988). However, dates of project operation have varied annually due to fiscal constraints resulting in a small portion of annual returns to this river not being monitored. Thus, historical escapement estimates to this stream should be considered conservative. This report presents results of similar studies conducted from 1988 to 1992.

### *Study Area*

The Sheenjek River is a second-order tributary of the Yukon River that heads in the glacial ice fields of the Romanzof Mountains, a northern extension of the Brooks Range, and flows southward approximately 400 km to its terminus on the Porcupine River (Figure 2). The sonar site is located approximately 10 km upstream from its terminus on the Porcupine River. Although created by glaciers, the river has numerous clearwater tributaries. Water clarity in the lower river is somewhat unpredictable but is generally clearest during periods of low water; water level normally begins to drop in late August and September. Upwelling groundwater composes a significant proportion of the river flow volume, especially in winter, and it is in these upwelling springs that fall chum salmon spawn, particularly within the lower 160 km. The Sheenjek River has been the single most important producer of fall chum spawners in the Yukon River drainage in recent years. Including results reported in this report for the period 1988–1992, annual escapement estimates averaged in excess of 100,000 spawners for the period 1985–1988 and approximately 86,000 spawners for the most recent four-year period 1989–1992. At present, a minimum escapement goal of 64,000 fall chum salmon exists for this stream.

### *Objectives*

Overall objectives for the Sheenjek River fall chum salmon studies conducted from 1988 to 1992 were to determine the timing and magnitude of adult salmon escapement and to collect age and sex information on sampled portions of the run, annually. To accomplish this, the following specific objectives were identified:

1. Estimate timing and magnitude of chum salmon escapement using hydroacoustic techniques;

2. Estimate age and sex composition of the spawning population from sampled portions of the escapement;

3. Support ongoing genetic stock identification (GSI) studies by sample collection; and

4. Monitor selected climatological and hydrological parameters daily at the project site for use as baseline data.

## METHODS

### *Hydroacoustic Equipment*

Two different model side-scanning sonar fish counters developed by the Hydrodynamics Division of Bendix Corporation[1] were used to estimate chum salmon abundance in the Sheenjek River from 1981 through 1987: a 1977-model counter and a 1981-model counter. While there are both functional and output differences between these two model counters, both were designed to function at an optimum counting range of 18.3 m. One or the other of these two model fish counters was used with its artificial substrate from a point bar from 1981 to 1984 (Figure 3).

During these first four years of study, it became evident that an unknown but relatively small percentage of salmon passed the project site undetected by sonar, beyond the 18.3-m counting range, when only a single fish counter was operated. It was hypothesized that a large proportion of those fish did so as a result of substrate avoidance (Barton 1985). As a consequence, these two fish counters were operated 100 m farther upstream (one from each river bank without substrates) from 1985 to 1987 in an attempt to insonify the entire width of the river. Over the course of this three-year period, river morphology at the new counting site was determined to be unsuitable due to bank erosion and changes to the river bottom from channel scouring and shifting during periods of high flow runoff.

As a result, a single and newer model (1985) Bendix fish counter was operated in 1988 from the same approximate place on the point bar originally used each year during 1981–1984. The 1985-model counter differed substantially from earlier models in several ways. First, the counting range could be extended to a maximum distance of 152 m; the maximum counting range of earlier-model counters was 30 m. Another improvement to the 1985-model counter was a rock-inhibitor feature which facilitates using the counter without the aid of an artificial substrate. Installation and operational procedures of the 1985-model counter varied little from the older counters used in previous years (Bendix Corporation 1985).

Based upon observations made in 1988 regarding salmon distribution and river morphology, it was not considered that the 1985-model counter with its rock-inhibitor feature and longer range counting ability, while an asset, was essential for estimating salmon escapement in the Sheenjek River. Thus, various model counters were used from 1989 to 1992. Whereas, the 1977-model counter was used in 1989, 1991, and 1992, a modified 1981-model counter was used in 1990. Modifications to that counter also included an extended counting range as well as a rock-inhibitor feature.

### *Site Selection and Transducer Deployment*

Physical location of counting operations during 1988–1992 was based upon the best of several river bottom profiles made shortly after arrival at the project site each year using a recording depth sounder

[1] Reference to trade names does not imply endorsement by the Alaska Department of Fish and Game.

(Figure 3). When the preferred location had been identified, a more detailed profile of the river bottom was obtained by stretching a rope across the river and measuring water depth with a pole every 3 m.

The modular aluminum substrates designed for use with the Bendix counters were not used due to the relatively smooth river bottom and the potential salmon avoidance problems observed in 1981–1984. The transducer was aimed perpendicular to the water current and deployed as far from shore as possible, generally in 0.5–1 m of water, in an attempt to maintain a minimum surface water velocity of approximately 30–45 cm/s at the point of deployment.

To determine if the transducer was aimed low enough so that salmon could not travel beneath the insonified water column, an artificial target (a 250-ml, air-tight, weighted plastic bottle attached to nylon twine) was allowed to drift downstream along the bottom through each electronic sector of the counting range. When the transducer was properly aimed, the artificial target appeared as a vertical deflection on an oscilloscope screen as it transected the sonar beam. The artificial target may or may not have simultaneously registered a count or multiple counts on the sonar counter, depending upon the length of time the target remained in the sonar beam as it drifted downstream.

As in previous years, a fish lead was constructed to shore from the deployed transducer to prevent upstream salmon passage inshore of the transducer. Fish leads were constructed using 5- x 10-cm fencing and 2.5-m metal "T" stakes. Fish leads were constructed to include the nearshore "dead range" of the sonar beam. A 5-m aluminum counting tower was also deployed near the transducer to facilitate visual and electronic calibrations when water conditions permitted. The transducer was periodically relocated and reaimed as necessitated by a rise or fall in river water level. On such occasions, the inshore fish lead and counting tower were adjusted appropriately.

### *Sonar Calibrations and Count Adjustments*

To determine if the number of fish registered by the sonar counter equaled the number of fish passing through the sonar beam, daily comparisons were made between oscilloscope observations and counter output. Overcounting and undercounting were minimized by adjusting the pulse repetition rate (PRR) or ping rate of the counter. Over and undercounting primarily resulted from changes in fish velocity, which was often a function of fluctuations in water level and velocity, photoperiod, or fish densities.

Salmon passing through the insonified water column produce a distinct pattern on an oscilloscope screen that can be distinguished from patterns caused by debris or smaller fish species. Consequently, oscilloscope data were collected daily and used to adjust both the ping rate of the counter as well as daily counts. Eight to ten 15- to 30-min calibration periods were scheduled to ensure adequate (increased) coverage was made during hours of peak diel migration. Less calibration effort was placed on periods of the day when passage rates were lowest. Frequency and duration of daily calibrations were adjusted as necessary. Duration of calibrations were based on the following criteria:

1. Stop calibration at 15 min if less than 10 fish are observed on the oscilloscope.

2. Extend 15-min calibration to 30 min if 10 or more fish are observed on the oscilloscope in the first 15 min.

Although a few occasions arose (generally in early season) when the counter's ping rate was subjectively changed based upon a qualitative evaluation of fish passage rates, the general rule to making adjustments follows. The counter's ping rate was changed at the end of a calibration period if the oscilloscope count exceeded a rate of 59 fish/h and the sonar count differed from the oscilloscope count by more than 15% during the calibration period. The new ping rate was calculated as (sonar count / oscilloscope count) x (current PRR setting). If salmon passage rates during calibrations on any given day never exceeded 59 fish/h, the ping rate was changed at 2400 hours of that particular day, but only if the sum of the sonar counts during the day's calibrations exceeded the sum of the oscilloscope counts during the day's calibrations by more than 15%.

Adjustments to sonar counts were made daily based upon oscilloscope calibration data. Hourly blocks of a day's count included in an adjustment (adjustment period) were defined by the time between those calibrations made when fish were passing at >59 fish/h. An associated adjustment factor ($A$), specific to each adjustment period ($i$), is calculated as follows:

$$A_i = \frac{(OC)}{(SC)}, \tag{1}$$

where:

$OC$ = oscilloscope count; and
$SC$ = unadjusted sonar count.

Adjustment factors were applied to the unadjusted sonar counts for each hour within an adjustment period. The resulting corrected sonar counts for each hour within a day were summed, yielding the estimated daily passage ($D$) of fall chum salmon that is represented by

$$D = \sum (A_i \times SC_i). \tag{2}$$

Adjustments to sonar counts were made after interpolated values were calculated for any missing sector counts or identified debris counts. Interpolated values were taken as the average count from the hour immediately preceding and following the missing sector(s). If fish passage rates on a given day never exceeded 59 fish/h during any calibration period, then only a single adjustment to the day's count was made, using all calibration data for that day. Additional sonar counts caused by fish other than chum salmon were assumed insignificant based upon historical test fishing records collected at the sonar site.

### *Test Fishing and Salmon Sampling*

An adult salmon beach seine (30 m long, 66 meshes deep, 6.4 cm stretch measure) was periodically fished approximately 10 km upstream of the sonar site to sample adult salmon for age and sex composition. The annual sample goal was 150 chum salmon. A small section of spine (3 vertebrae minimum) was removed in an area posterior to the anal fin of each fish for subsequent age analysis. Vertebrae were cleaned, dried, and read with the aid of a dissecting scope. Ages were reported by the European method: number of freshwater annuli, decimal, number of saltwater annuli. Although sex was determined by external examination of most fish, positive sex determination was made by an incision in the belly of fish sampled for vertebrae, if necessary.

For years in which data were collected to support ongoing GSI studies, chum salmon were additionally sampled as follows. A small section each of the liver and heart, eye fluid, and a muscle sample taken from the lateral region of each fish between the operculum and dorsal fin, were collected. Individual samples were placed in separate vials and stored in liquid nitrogen prior to shipment to Anchorage for subsequent analyses. GSI sample goals were 100–150 chum salmon.

### *Climatological and Hydrological Observations*

A water level gauge was installed at the sonar site and monitored daily at approximately noon; readings were made to the nearest centimeter. Surface water temperature was measured daily with a pocket thermometer, and surface water velocity was measured with a digital flow meter at the location of the transducer. Other daily observations included recording the occurrence of precipitation, as well as the estimated wind velocity, direction, and percent cloud cover.

## RESULTS

### *River and Sonar Counting Conditions*

Initial transducer deployment during 1988–1992 approximated the same place on the point bar each year. Although variations in river width and water level were observed annually, depending upon the dates the river profiles were obtained, river bottom composition and gradient remained similar from year to year. In general, the river bottom in the vicinity of the transducer sloped gently from the convex bank (point bar) with a rate of fall of approximately 8 cm/m to a distance of approximately 2/3 to 3/4 of the channel's width, depending on the date of observation (Figure 4). At that point the bottom made a more pronounced drop to the thalweg before making a much sharper rise to the concave bank (cutbank).

The Sheenjek River at the project site experienced large variations in water level, both during the season and among years (Figure 5; Appendices A.1.–A.5). Between 21 August and 20 September minimum and maximum water level differed by 148 cm in 1988, 71 cm in 1989, 19 cm in 1990, 32 cm in 1991, and 92 cm in 1992. These variations, together with migration behavior of chum salmon in the Sheenjek River, had a pronounced effect on the ability of the hydroacoustic equipment to accurately enumerate upstream migrant salmon.

In both 1988 and 1989 river water levels and surface water velocities were higher than in the years 1990–1992. River width at the selected counting location in 1988 measured approximately 57 m wide on 20 August. Water level increased 30 cm during the 9-d period between 18 and 27 August, after which a 15-cm drop occurred through the end of the month. At that time water level remained fairly stable, fluctuating ± 7 cm through 6 September. A rapid rise occurred over the next 48 h; increasing 110 cm. When the water crested on 8 September, it was estimated that another 15-cm rise would have flooded the project site. However, water gradually receded over the next two-week period more than 45 cm, stabilizing on approximately 23 September until termination of the project on 27 September.

In 1989 the river channel at the project site measured 63 m across on 23 August, and the water was full of floating debris. Between 22 and 25 August the water level rose nearly 60 cm in 72 h. Although the water level then declined by 46 cm through 1 September, another rise of 25 cm was observed by 9 September. Subsequent to 9 September the water level declined at a rate of approximately 4–5 cm/d until project termination on 26 September.

In comparison to 1988 and 1989, river width in 1990 was measured at only 50 m on 22 August. Water level remained the most stable that year, with minimum and maximum elevations differing by only 23 cm between 21 August and 28 September. The water level fluctuated by less than 3 cm/d for the duration of the project.

In both 1991 and 1992 the Sheenjek project was initiated nearly two weeks earlier than in the previous three years. The river's width was measured at 63 m on 8 August in 1991 and 59 m on 11 August in 1992. Water level in 1991 made a continual decline through 24 September. Rate of decline approximated 7–8 cm/d through 15 August, slowing to a rate of decline of approximately 2 cm/d for the last half of August. Throughout September the rate of decline fluctuated no more than 1 cm/d. In 1992, during the period 9–26 August, water level steadily declined by 76 cm. Water level increased 80 cm during the last week of August, then dropped in excess of 90 cm by 19 September. On 20 September the project was terminated due to ice floes in the river. This was the earliest termination of the project since its inception in 1981.

The increased surface water velocities that accompanied the higher water levels experienced in 1988 and 1989 are illustrated by the average surface water velocity, which was maintained at transducer positions during those years (Figure 6).

In 1988 surface velocities measured at the transducer ranged from a low of 31 cm/s to a high of 107 cm/s, averaging 56 cm/s for the period 21 August through 28 September. In 1989 surface water velocities at the transducer ranged from 20 to 80 cm/s, also averaging 56 cm/s for the period 20 August through 24 September. By comparison, surface water velocities measured at the transducer ranged from 12 to 38 cm/s in 1990 (average 24 cm/s) between 21 August and 28 September. Surface velocities at the transducer in 1991 ranged from 10 to 52 cm/s between 10 August and 9 September. Subsequent to 9 September (through the 24th) velocities never exceeded 10 cm/s, being too low to measure with the flow meter on site.

The greatest drop in water level relative to 1 September occurred in 1992: a drop of 76 cm by as early as 19 September. Although no surface water measurements were obtained in 1992 due to a broken flow meter, low water levels again resulted in extremely low surface velocities; these were judged similar to those observed in the latter part of the 1991 season.

Instantaneous surface water temperature measurements indicated that the coldest water temperatures were observed in 1992 (Figure 7). In that year water temperature had fallen to 4°C by as early as 12 September. Surface temperature had reached 1°C by 17 September; the coldest ever recorded at the project site. By comparison, surface water temperatures on 17 September in 1988 through 1991 ranged from 6° to 8°C. The second coldest surface water temperatures were recorded in late September 1989, when 2°C was measured between 20 and 26 September.

### *Abundance Estimation*

Sonar counts were adjusted daily based upon oscilloscope calibrations. Although the total number of calibrations varied annually depending on project duration and fish passage rates, an annual average of 390 calibrations averaging 21.5 min in duration were made yearly from 1988 to 1992 (Table 2; Appendices A.6.–A.10). This approximated an average of 138 h of calibration time per year. Calibrations were weighted to periods of the day when upstream migration was heaviest (Figure 8). For example, an average of 41% of calibration effort occurred between the hours of 0001 to 0600, corresponding to an average fish passage estimate of 37% for the same block of time. Similarly, an average of 25% calibration effort occurred between 1800 and 2400 hours, corresponding to an average fish passage estimate of 27% for that block of time.

Run strength and timing of Sheenjek River chum salmon varied during the years 1988–1992 (Table 3; Figure 9). Sonar-estimated escapements ranged from a low of 40,866 (1988) to a high of 86,496 (1991). However, abundance estimates should be considered conservative because they do not include fish present before counting began, fish passing after counting ceased, nor fish passing beyond the sonar counting range. Initiation of sonar counting ranged from 21 to 24 August in 1988, 1989, and 1990, but occurred on 9 August in 1991 and 1992, about two weeks earlier. The range in project termination dates, however, was somewhat more confined (24–28 September), with the exception of 1992 when early freeze-up of the river necessitated cessation of counting on 20 September.

The 1988 sonar-estimated escapement was 40,866 chum salmon for the 38-d period 21 August through 27 September. During this period a multimodal entry pattern was exhibited with more prominent peaks in passage observed on 3 and 17 September. However, this was the third lowest escapement recorded in the Sheenjek River since inception of the project in 1981.

A sonar-estimated escapement of 79,116 chum salmon was made for the 33-d period 24 August through 25 September 1989. However, it is quite apparent that at least the front half of an early peak in the Sheenjek River chum salmon run in 1989 went unmonitored. Nearly 2,700 fish were estimated passing on the first day counting operations began (24 August), with daily counts dropping and then building to a second peak on 9 September. A third peak in sonar counts was observed on 24 September. An aerial survey was flown on 22 August, two days prior to the start of sonar counting, to estimate the relative abundance of chum salmon already present in the river. Survey conditions were rated fair in the lower 75 km of the river where 3,970 chum salmon were observed. Survey conditions were extremely poor upstream due to a swollen and silt-laden river. Only 106 additional fish were seen up to Outlook Point, resulting in a total survey count of 4,076 chum salmon. Based on comparisons of peak aerial survey estimates of chinook salmon in the Chena River (Tanana River drainage) to estimates of total abundance using mark-and-recapture techniques, it was conjectured that the aerial survey of the Sheenjek River accounted for no more than 20% of the fish present in the river at the time of the survey. This resulted in an abundance estimate that was on the order of magnitude of 20,000 fish that were already present in the river prior to sonar operations on 24 August. This number, together with the sonar-estimated escapement of 79,116 chum salmon between 24 August and 25 September, suggests the Sheenjek River chum salmon escapement in 1989 had approximated 99,000 spawners.

In 1990 a somewhat bimodal chum salmon entry pattern was observed in the Sheenjek River during the 38-d period of 22 August through 28 September. Daily counts were relatively high (>1,700 fish) upon startup of the project on 22 August, and an early peak in counts (1,940 fish) occurred on 24 August. The most pronounced peak in passage was centered around 17 September when approximately 2,900 fish were estimated passing on that day. Total sonar-estimated escapement was 62,200 chum salmon.

In both 1991 and 1992 sonar counting began on 9 August. The sonar-estimated escapements were 86,496 chum salmon through 24 September 1991 (a period of 47 d) and 78,808 through 20 September 1992 (a period of 43 d). Whereas in 1991 a somewhat gradual but steady increase in counts was observed with peak passage occurring on 15 September (4,823 fish), in 1992 a distinct bimodal entry pattern was observed. The first peak in chum salmon passage (2,347 fish) was observed on 20 August and a larger second peak (6,347 fish) on 14 September.

### *Temporal and Spatial Distribution*

A diel pattern in migration of Sheenjek River chum salmon has been observed in most years (Barton 1982, 1983, 1984, 1985, 1987). In periods of darkness or suppressed light, upstream migration is heaviest and fish move in greater numbers close to shore. With the ensuing hours of daylight, upstream migration greatly subsides and fish move farther from shore. The overall average temporal pattern of movement observed from 1988 to 1992 is shown in Figure 10 and Table 4 (also see Figure 8). On average, the period of greatest upstream migration occurred between midnight and 0600 hours (37%), followed by the period 1800 hours to midnight (27%). The period of least movement occurred between 1200 and 1800 hours (13%).

Chum salmon swimming speed was highly variable in the Sheenjek River within and among years as indicated by the number of adjustments made to the counter's ping rate. For the sonar counter to accurately enumerate salmon as they pass through the insonified zone, an appropriate ping rate must be selected that accommodates fish velocities. As a salmon swims faster or slower, the ping rate must be increased or decreased accordingly. However, the ping rate can only be slowed to a certain level. Should fish speeds be reduced to a rate lower than that which can be accommodated by the minimum ping rate needed for accurate enumeration, then the fish remain in the insonified zone too long and the counter overcounts.

It was noted that swimming speed was greatly reduced when low surface water velocities were encountered as a result of a drop in river water level, even during periods of darkness. A major function of the fish lead was to direct salmon to offshore areas through the insonified zone; an area where water velocities were comparatively greater than along shore. There appeared to be a threshold in surface water velocity that acted as a deterrent against salmon, reducing their swim speed to a level that allowed them to linger or hold in the water column, a velocity estimated to be approximately 30–45 cm/s. Thus, to the extent possible, transducers and fish leads were positioned to maintain a surface water velocity around the end of the lead and across the insonified zone that did not fall below the threshold level.

The higher water levels and velocities in 1988 and 1989 allowed this to be more readily accomplished than in 1990–1992. This is reflected in the overall calibration results for each year (Table 2). In 1988 and 1989 the sonar overcounted an average of 19% and 24%, respectively. By comparison, during the lower-water years, average percent overcount by the sonar counter was 42% in 1990, 144% in 1991, and 122% in 1992.

Water levels and resulting velocities also had an effect upon the spatial distribution of salmon as they passed the sonar site upstream. The percentage of salmon passing upstream in the outer, offshore electronic sectors of the acoustic beam increased with reduced water velocities. In 1988 nearly all upstream migrants passed nearshore along the point bar (Figure 11). In that year the 1977-model, 12-sector counter was used prior to 1 September, while the 1985-model, 16-sector counter was used subsequent to 31 August. Approximately 3% of the salmon counted with the 1977 counter were estimated passing in the outer sector (sector 12), whereas <1% of those counted with the 1985 counter were observed in the outer sector of that unit (sector 16). Pattern of passage was similar in 1989 with <1% of the total counts observed in the outer sector of the 1977-model counter (Figure 12). Again, in these two years of higher water velocities at the project site, salmon tended to migrate along the point bar, skirting the stronger main river current.

In 1990–1992, years when average water velocities were comparatively much reduced from those observed in 1988 and 1989, increased passage was observed in outer sectors of the hydroacoustic beam, particularly in 1990 and 1991 (Figure 12).

Distance or range of insonification varied within and among years from 1988 to 1992, depending upon initial placement and subsequent relocation of the transducer as necessitated by fluctuations in river water levels (Appendices A.11–A.15). Consequently, extent of uninsonified zones also varied. In the two years of higher water levels and stronger currents, the average uninsonified distance outward from the cutbank was approximately 11 m in 1988 and 21 m in 1989. During the lowest-water year of 1990, average distance of uninsonification was approximately 6 m. Extent of uninsonification averaged 13 m in 1991 and 23 m in 1992. No attempt was made to estimate fish passage in these uninsonified zones, but it is believed to have been relatively small based upon a review of the spatial distribution of fish by electronic sector.

### *Age and Sex Composition*

Enumeration of salmon escapement received the highest priority associated with the Sheenjek River project, although an attempt was made to sample portions of annual escapements for age and sex composition. The number of beach seine hauls made to collect salmon ranged from 11 to 24 per year from 1988 to 1992 (Table 5). All seine hauls were made along gravel bars between the sonar site and 9 km upstream. Apart from age and sex sampling, a total of 80 chum salmon were also sampled each year in 1988 and 1989 for subsequent GSI analysis. Although no GSI collections were made in this river in 1990 or 1991, a total of 100 chum salmon were sampled in 1992.

In 1988 test fishing effort was suspended early in the season in view of problems experienced with high water and time necessary to ensure proper functioning of hydroacoustic equipment. Only 115 chum salmon (19 males; 96 females) were collected in 18 beach seine hauls made between 20 and 25 September, in addition to 83 Arctic grayling *Thymallus arcticus signifer*, 1 longnose sucker *Catostomus catostomus*, and 2 whitefish *Coregonus* spp. Seven additional chum salmon carcasses (3 males; 4 females) were collected from gravel bars for sampling on 21 September. Samples were dominated by age-0.3 fish (68%) and had a male-to-female ratio of 1.0:4.3 (Table 6). Age-0.4 fish represented 29% of the sample, with age-0.2 fish representing approximately 3%. It should be pointed out that samples were collected only 5 d near the latter part of the chum salmon run in 1988. Thus, resulting age and sex composition may not be representative of the entire run in that year. For example, the higher-than-usual percentage of females may have been a function of timing differences by sex.

In 1989, 24 seine hauls resulted in a total catch of 340 chum salmon (147 males; 193 females), 14 Arctic grayling, and 1 whitefish during the period 27 August–20 September. A subsample of 154 chum salmon revealed age composition to be predominately age 0.3 (77%), followed by ages 0.4 (17%) and 0.2 (5%).

Fifteen seine hauls made between 28 August and 25 September 1990 resulted in a total catch of 326 chum salmon (158 males; 168 females), 11 Arctic grayling, 2 northern pike *Esox lucius*, and 1 longnose sucker. In a subsample of 143 chum salmon, age 0.3 again predominated (71%), followed by age 0.4 (25%). Age 0.2 represented 3%.

In 1991 a total of 406 chum salmon (190 males; 216 females), 49 Arctic grayling, 2 whitefish, and 2 longnose suckers were captured in 11 seine hauls during the period 15 August–18 September. Although age 0.3 again predominated (60%) a subsample of 147 chum salmon, the proportion of age-0.4 fish observed was approximately 40%. No age-0.2 fish were observed in the subsample.

In 1992 age-0.3 chum salmon represented <20% of a sample of 134 fish collected from 13 seine hauls during the period 6–14 September. Age-0.4 chum salmon predominated at nearly 81%. As in 1991, no age-0.2 fish were represented. An additional 14 Arctic grayling, 1 northern pike, 6 whitefish, and 1 longnose sucker were also captured in 1992.

## DISCUSSION

Sonar-estimated escapements in the Sheenjek River must be viewed in context with dates of project operation. For that reason it is conjectured that a larger proportion of the total annual escapement was enumerated in 1991 and 1992 than in 1988–1990. This is illustrated by the daily counts observed at the start of the Sheenjek River project each year as depicted in Figure 9, by a comparison in run entry and sonar passage estimates of chum salmon made by the U.S. Fish and Wildlife Service in the Chandalar River (Daum et al. 1992), and by daily passage observed in the Sheenjek River for the years 1986–1990. Unfortunately, no comparisons are available for the years 1991 and 1992; the Chandalar River project did not operate after 1990.

Entry patterns of chum salmon in these two rivers appear to be very similar (Figure 13). For example, in 1986 the fall chum salmon run was early, peak counts occurring in the Chandalar River on 25 and 26 August. Peak counts in the Sheenjek River were observed from 25 August through approximately 30 August that same year. In 1987 the fall chum run was comparatively later and more compressed. Peak passage in that year in both the Chandalar and Sheenjek Rivers occurred throughout the first week of September. In both years the entry pattern in both rivers appeared to consist of a single mode. Even though project initiation was somewhat delayed, I believe the majority of the run was monitored in the Sheenjek River in 1986 and 1987. This was based upon the very low percentage of fish present in the Chandalar River during the first part of August.

Similarly, in 1988 it is also likely that only a small portion of the Sheenjek River run was missed due to delayed initiation of the project on 21 August. In that year a somewhat bimodal entry pattern of chum salmon was exhibited in the Chandalar River: the first peak in passage centered around 1 September and the second on approximately 10 September. This compared to a bimodal entry pattern on the Sheenjek

River with peaks observed on 3 and 17 September. Less than 10% (~4,500 chum salmon) of the total sonar-estimated escapement in the Chandalar River was observed prior to 21 August. Consequently, I believe that few chum salmon were present in the Sheenjek River prior to startup on 21 August.

By comparison, I believe that a larger portion of the Sheenjek River chum salmon escapements in 1989 and 1990 were not monitored as a result of delayed project startup dates. A trimodal entry pattern was observed in the Chandalar River in 1989: an early peak occurred on 18 August, and subsequent peaks in passage were observed on 5 and 26 September. As previously discussed, at least three peaks in passage occurred in the Sheenjek River in 1989, the first occurring sometime prior to startup on 24 August. The second and third peaks were observed on 9 and 24 September, very similar to those observed in the Chandalar River. The aerial survey results on the Sheenjek River in 1989 indicated approximately 20,000 chum salmon may have already been present prior to sonar operations. That would represent approximately 20% of the total escapement; i.e., 20% of approximately 99,000 fish (20,000 fish in the river prior to sonar counting plus the sonar estimate of 79,116 between 24 August and 25 September). Comparatively, approximately 21% of the sonar-estimated escapement in the Chandalar River in 1989 was observed through the first peak in passage on 18 August (an estimated 34% occurred prior to 24 August).

In 1990 approximately 20% (15,900 fish) of the total estimated escapement in the Chandalar River occurred prior to 22 August. Similarly, if 20% of the Sheenjek River escapement was upriver prior to initiation of sonar counting on 22 August, then an additional 15,550 chum salmon escaped. This, plus the sonar-estimated escapement of 62,200, would suggest that the total escapement was on the order of 78,000 chum salmon in 1990.

It is conjectured that the sonar escapement estimates in 1991 and 1992 more closely reflect total spawning abundance in those years because the Sheenjek River project was initiated two to three weeks earlier than in previous years.

### *Abundance Estimates Relative to Escapement Goals*

Two escapement goals existed for the Sheenjek River during the course of these studies: >62,000 for 1988–1990 and >64,000 for 1991–1992. Whether or not the goals were achieved each year must again be viewed in context with the dates of project operation.

Although project termination has been somewhat more consistent since 1981, ranging from 22 to 29 September (excluding 1992), startup dates have varied over a much wider range. Project initiation was confined to approximately the fourth week of August from 1981 to 1985 and the third week of August from 1986 to 1990. It must be realized that the sonar-estimated escapements during these years (1981–1990), or a portion of these years, provided the foundation upon which the existing (>64,000) and former (>62,000) escapement goals were predicated (JTC 1990). Between 1981 and 1990 the sonar project operated for periods approximating 26 August through 24 September. Thus, the former and current

Sheenjek River escapement goal should be viewed as a minimum desired number of chum salmon passing the sonar site subsequent to 25 August.

Given this, it is quite apparent that the 1988 escapement goal of >62,000 chum salmon was not achieved that year. Only 40,866 chum salmon were estimated passing the project site from 21 August through 27 September. Because four-year-old fish (age 0.3), the predominate run cohort (1984 brood year), were produced from one of the poorest escapements on record (ADF&G 1988), low numbers of fall chum salmon were expected throughout the Yukon River drainage in 1988. In 1984 only 27,130 chum salmon were estimated passing the sonar site subsequent to 29 August, one of the lowest escapement estimates on record for the Sheenjek River.

The 1989 Sheenjek River escapement goal (>62,000) was achieved as evidenced by the passage of more than 74,000 chum salmon subsequent to 25 August. Although not as poor as observed in 1988, estimated escapement in 1990 was also below the escapement goal in place for that year (>62,000). Whereas 62,200 chum salmon were estimated passing the sonar site between 22 August and 28 September, slightly in excess of 55,000 were estimated passing subsequent to 25 August. A local hunting guide reported that in May 1991, in an area of the Sheenjek River between approximately 45 and 90 km upstream, stretches of up to 1 km of the river were completely dry. Although no salmon carcasses were observed in these stretches, salmon redds were present. Such an observation follows the low water levels encountered at the project site in 1990. The suspected major component of the 1994 return will be from the brood year 1990. It is not known what effect, if any, low water conditions in the Sheenjek River during the winter of 1990–1991 will have on the 1994 return. No reports have been received concerning water levels observed in the Sheenjek River during the spring of 1992 or 1993.

In 1991 and 1992 the Sheenjek River project was initiated on 9 August, two to three weeks earlier than in previous years. In 1991 an estimated 86,496 chum salmon passed through 24 September, of which more than 74,000 were estimated passing subsequent to 25 August. Therefore, the 1991 escapement goal of >64,000 was achieved. By comparison, in 1992 an estimate of 78,808 chum salmon was made for the period 9 August–20 September, of which approximately 63,500 were estimated passing subsequent to 25 August. However, I believe the escapement goal was achieved in 1992 because chum salmon were still passing the sonar site at approximately 1,000 fish/d upon early termination of the project on 20 September.

The fact that the Sheenjek River escapement goal was achieved in 1992 was no doubt a function of the complete closure of the Alaskan commercial fisheries on the mainstem Yukon River. That closure was a product of the low abundance of fall chum salmon present in the mainstem Yukon River that year. Four-year-old (age 0.3) fall chum salmon returning in 1992, the predominate age class for Yukon River fall chum salmon, were produced from poor escapements observed throughout the drainage in 1988 (ADF&G 1992a; ADF&G 1992b). It is conjectured that the inordinately cold winter of 1988–1989 throughout interior Alaska had a major deleterious effect upon production of fall chum salmon that year. This is in view of the apparent collapse of the four-year-old component of the 1992 return, drainage-wide (ADF&G 1993). Among those streams in the Yukon River drainage that have a fall chum salmon escapement goal in place, the Sheenjek River was the only one for which the escapement goal was achieved in 1992.

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Table 1. Alaskan and Canadian total utilization of Yukon River fall chum salmon, 1961–1992 (taken from JTC 1992).

| Year | Canada [a] | Alaska [b,c] | Total |
|---|---|---|---|
| 1961 | 9,076 | 144,233 | 153,309 |
| 1962 | 9,436 | 140,401 | 149,837 |
| 1963 | 27,696 | 99,031 [d] | 126,727 |
| 1964 | 12,187 | 128,707 | 140,894 |
| 1965 | 11,789 | 135,600 | 147,389 |
| 1966 | 13,192 | 122,548 | 135,740 |
| 1967 | 16,961 | 107,018 | 123,979 |
| 1968 | 11,633 | 97,552 | 109,185 |
| 1969 | 7,776 | 183,373 | 191,149 |
| 1970 | 3,711 | 265,096 | 268,807 |
| 1971 | 16,911 | 246,756 | 263,667 |
| 1972 | 7,532 | 188,178 | 195,710 |
| 1973 | 10,135 | 285,760 | 295,895 |
| 1974 | 11,646 | 383,552 | 395,198 |
| 1975 | 20,600 | 361,600 | 382,200 |
| 1976 | 5,200 | 228,717 | 233,917 |
| 1977 | 12,479 | 340,757 | 353,236 |
| 1978 | 9,566 | 331,250 | 340,816 |
| 1979 | 22,084 | 593,293 | 615,377 |
| 1980 | 22,218 | 466,087 | 488,305 |
| 1981 | 22,281 | 654,976 | 677,257 |
| 1982 | 16,091 | 357,084 | 373,175 |
| 1983 | 29,490 | 495,526 | 525,016 |
| 1984 | 29,267 | 383,055 | 412,322 |
| 1985 | 41,265 | 474,216 | 515,481 |
| 1986 | 14,493 | 303,485 | 317,978 |
| 1987 | 44,480 | 361,663 [d] | 406,143 |
| 1988 | 33,565 | 320,666 | 354,231 |
| 1989 | 23,020 | 511,225 | 534,245 |
| 1990 | 33,622 | 321,059 | 354,681 |
| 1991 [e] | 35,418 | 396,565 | 431,983 |
| 1992 [e,f] | 23,182 | 229,130 | 252,312 |
| Average | | | |
| 1961–81 | 13,529 | 262,118 | 275,647 |
| 1982–86 | 26,121 | 402,673 | 428,794 |
| 1987–91 | 34,021 | 382,236 | 416,257 |

[a] Commercial, Indian food, and domestic catches combined.

[b] Catch in number of salmon. Includes estimated number of salmon harvested for commercial production of salmon roe.

[c] Commercial, subsistence, and personal-use catches combined.

[d] Subsistence catch only; commercial fishery did not operate.

[e] Preliminary.

[f] Subsistence and noncommercial harvest data unavailable. Average subsistence harvest substituted.

Table 2. Sheenjek River sonar counter calibration effort, 1988–1992.

| Year | Number of Calibrations | Total Calibration Time (h) | Average Duration (min) | Average Daily Calibration Effort 0001–0600 hours | 0601–1200 hours | 1201–1800 hours | 1801–2400 hours | Total Oscilloscope Count | Total Sonar Count | Overall Percent Over/Under Count |
|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | 362 | 122.1 | 20.2 | 43.5% | 21.9% | 9.4% | 25.1% | 6,347 | 7,569 | 19.3% |
| 1989 | 500 | 166.6 | 20.0 | 33.2% | 22.3% | 11.7% | 32.8% | 19,335 | 24,030 | 24.3% |
| 1990 | 326 | 116.3 | 21.4 | 37.9% | 25.4% | 9.2% | 27.5% | 9,445 | 13,439 | 42.3% |
| 1991 | 462 | 162.4 | 21.1 | 38.7% | 26.7% | 14.1% | 20.5% | 17,964 | 43,841 | 144.0% |
| 1992 | 299 | 122.8 | 24.6 | 51.9% | 19.3% | 11.7% | 17.1% | 14,043 | 31,247 | 122.5% |
| Total | 1,949 | 690.2 | | | | | | 67,134 | 120,126 | 78.9% |
| Average | 390 | 138.0 | 21.5 | 41.0% | 23.1% | 11.2% | 24.6% | 13,427 | 24,025 | 78.9% |

Table 3. Sonar-estimated escapement of fall chum salmon in the Sheenjek River, 1988–1992.

| Day | Date | 1988 | 1989 | 1990 | 1991 | 1992 | Date |
|---|---|---|---|---|---|---|---|
| 1 | 09 Aug | | | | 255 | 136 | 09 Aug |
| 2 | 10 Aug | | | | 301 | 172 | 10 Aug |
| 3 | 11 Aug | | | | 179 | 102 | 11 Aug |
| 4 | 12 Aug | | | | 173 | 272 | 12 Aug |
| 5 | 13 Aug | | | | 178 | 216 | 13 Aug |
| 6 | 14 Aug | | | | 282 | 337 | 14 Aug |
| 7 | 15 Aug | | | | 551 | 670 | 15 Aug |
| 8 | 16 Aug | | | | 521 | 571 | 16 Aug |
| 9 | 17 Aug | | | | 418 | 1,100 | 17 Aug |
| 10 | 18 Aug | | | | 591 | 1,570 | 18 Aug |
| 11 | 19 Aug | | | | 668 | 1,003 | 19 Aug |
| 12 | 20 Aug | | | | 446 | 2,347 | 20 Aug |
| 13 | 21 Aug | 961 | | | 1,012 | 1,767 | 21 Aug |
| 14 | 22 Aug | 1,027 | | 1,718 | 1,990 | 1,353 | 22 Aug |
| 15 | 23 Aug | 884 | | 1,825 | 1,754 | 1,189 | 23 Aug |
| 16 | 24 Aug | 744 | 2,685 | 1,940 | 889 | 1,390 | 24 Aug |
| 17 | 25 Aug | 810 | 2,321 | 1,620 | 1,591 | 1,147 | 25 Aug |
| 18 | 26 Aug | 1,528 | 1,392 | 1,047 | 1,684 | 893 | 26 Aug |
| 19 | 27 Aug | 1,203 | 1,129 | 1,055 | 1,846 | 1,032 | 27 Aug |
| 20 | 28 Aug | 1,087 | 1,009 | 1,337 | 1,508 | 778 | 28 Aug |
| 21 | 29 Aug | 756 | 733 | 1,605 | 1,196 | 463 | 29 Aug |
| 22 | 30 Aug | 914 | 1,265 | 881 | 905 | 943 | 30 Aug |
| 23 | 31 Aug | 1,512 | 933 | 1,609 | 1,676 | 840 | 31 Aug |
| 24 | 01 Sep | 1,548 | 1,598 | 1,570 | 2,164 | 835 | 01 Sep |
| 25 | 02 Sep | 1,492 | 1,759 | 1,695 | 1,749 | 830 | 02 Sep |
| 26 | 03 Sep | 2,203 | 1,739 | 1,002 | 1,808 | 1,217 | 03 Sep |
| 27 | 04 Sep | 1,991 | 2,819 | 1,159 | 2,026 | 2,023 | 04 Sep |
| 28 | 05 Sep | 1,309 | 2,571 | 955 | 2,476 | 2,093 | 05 Sep |
| 29 | 06 Sep | 1,286 | 2,936 | 1,339 | 1,241 | 3,154 | 06 Sep |
| 30 | 07 Sep | 1,542 | 4,210 | 1,259 | 3,490 | 4,200 | 07 Sep |
| 31 | 08 Sep | 1,297 | 3,581 | 1,071 | 2,680 | 3,092 | 08 Sep |
| 32 | 09 Sep | 1,443 | 4,858 | 1,411 | 4,201 | 4,274 | 09 Sep |
| 33 | 10 Sep | 1,073 | 4,051 | 854 | 3,541 | 3,209 | 10 Sep |
| 34 | 11 Sep | 696 | 3,551 | 1,746 | 2,236 | 3,815 | 11 Sep |
| 35 | 12 Sep | 340 | 3,414 | 1,726 | 3,136 | 3,816 | 12 Sep |
| 36 | 13 Sep | 673 | 3,227 | 1,803 | 3,139 | 4,047 | 13 Sep |
| 37 | 14 Sep | 703 | 2,797 | 2,196 | 3,145 | 6,347 | 14 Sep |
| 38 | 15 Sep | 1,037 | 2,027 | 2,065 | 4,823 | 4,289 | 15 Sep |
| 39 | 16 Sep | 1,275 | 2,498 | 2,175 | 4,240 | 3,232 | 16 Sep |
| 40 | 17 Sep | 1,943 | 3,035 | 2,867 | 2,729 | 2,473 | 17 Sep |
| 41 | 18 Sep | 1,637 | 2,090 | 1,909 | 2,734 | 2,158 | 18 Sep |
| 42 | 19 Sep | 1,209 | 1,839 | 2,020 | 3,119 | 2,406 | 19 Sep |
| 43 | 20 Sep | 1,151 | 2,321 | 2,372 | 3,319 | 1,007 | 20 Sep |
| 44 | 21 Sep | 716 | 1,273 | 2,444 | 2,461 | ice up | 21 Sep |
| 45 | 22 Sep | 743 | 1,384 | 2,667 | 1,924 | | 22 Sep |
| 46 | 23 Sep | 583 | 2,434 | 1,848 | 2,071 | | 23 Sep |
| 47 | 24 Sep | 522 | 2,965 | 1,819 | 1,430 | | 24 Sep |
| 48 | 25 Sep | 365 | 2,672 | 1,923 | | | 25 Sep |
| 49 | 26 Sep | 344 | | 1,392 | | | 26 Sep |
| 50 | 27 Sep | 319 | | 1,478 | | | 27 Sep |
| 51 | 28 Sep | | | 798 | | | 28 Sep |
| Totals | | 40,866 | 79,116 | 62,200 | 86,496 | 78,808 | |

Table 4. Diel distribution of fall chum salmon at the Sheenjek River project site, 1988–1992.

| Year | Percent Passage by Time of Day | | | |
|---|---|---|---|---|
| | 2400–0600 Hours | 0600–1200 Hours | 1200–1800 Hours | 1800–2400 Hours |
| 1988 | 0.408 | 0.233 | 0.121 | 0.238 |
| 1989 | 0.387 | 0.225 | 0.108 | 0.280 |
| 1990 | 0.377 | 0.204 | 0.131 | 0.287 |
| 1991 | 0.305 | 0.249 | 0.144 | 0.302 |
| 1992 | 0.387 | 0.237 | 0.150 | 0.225 |
| 1988–92 | 0.373 | 0.230 | 0.131 | 0.267 |

Table 5. Test fishing effort in the Sheenjek River, 1988–1992.

| Year | Date | Seine Sets | Chum Salmon Males | Chum Salmon Females | Arctic Grayling | Northern Pike | Whitefish species | Sucker | Remarks [a] |
|---|---|---|---|---|---|---|---|---|---|
| 1988 | 20 Sep | 6 | 5 | 24 | 20 | | | 1 | River-kilometer (Rkm) 19. All chums sampled for ASL and GSI. |
| | 21 Sep | 3 | 9 | 43 | 2 | | | | Rkm 19. All chums sampled for ASL; 51 sampled for GSI. |
| | 21 Sep | – | 3 | 4 | | | | | Handpicked carcasses from bars; all sampled for ASL. |
| | 22 Sep | 1 | | 1 | 4 | | | | Rkm 10 (sonar site). |
| | 24 Sep | 5 | 3 | 17 | 25 | | 1 | | Rkm 19. All chums sampled for ASL. |
| | 25 Sep | 3 | 2 | 11 | 32 | | 1 | | Rkm 19. All chums sampled for ASL. |
| | Total | 18 | 22 | 100 | 83 | 0 | 2 | 1 | |
| 1989 | 27 Aug | 5 | 1 | 2 | 4 | | | | Between Rkm 10-19. All chums sampled for ASL. |
| | 29 Aug | 5 | 2 | 5 | 5 | | | | Between Rkm 10-19. All chums sampled for ASL. |
| | 31 Aug | 3 | | | | | | | Rkm 19. No catch |
| | 01 Sep | 1 | 2 | 2 | | | | | Rkm 10. All chums sampled for ASL. |
| | 04 Sep | 2 | 11 | 16 | | | | | Rkm 10. All chums sampled for ASL. |
| | 04 Sep | 2 | 4 | 1 | 3 | | 1 | | Rkm 19. All chums sampled for ASL. |
| | 10 Sep | 2 | 3 | 11 | | | | | Rkm 19. All chums sampled for ASL. |
| | 11 Sep | 1 | 17 | 8 | 1 | | | | Rkm 19. Chums sampled: 3 males/7 females ASL. |
| | 13 Sep | 1 | 17 | 28 | | | | | Rkm 19. All chums sampled for ASL and GSI. |
| | 14 Sep | 1 | 45 | 83 | 1 | | | | Rkm 19. Chums sampled: 14 males/21 females for ASL and GSI. |
| | 20 Sep | 1 | 45 | 37 | | | | | Rkm 19. Chums sampled: 5 males/4 females ASL. |
| | Total | 24 | 147 | 193 | 14 | 0 | 1 | 0 | |
| 1990 | 28 Aug | 2 | 9 | 8 | 4 | | | | Rkm 19. All chums sampled for ASL. |
| | 30 Aug | 1 | 9 | 12 | | | | | Rkm 19. Chums sampled: 9 males/6 females for ASL. |
| | 06 Sep | 2 | 37 | 34 | 1 | | | 1 | Rkm 19. Chums sampled: 19 males/21 females for ASL. |
| | 13 Sep | 5 | 9 | 11 | 1 | 2 | | | Rkm 10. All chums sampled for ASL. |
| | 17 Sep | 3 | 3 | 20 | | | | | Rkm 10. Chums sampled: 3 males/17 females for ASL. |
| | 22 Sep | 1 | 25 | 17 | 5 | | | | Rkm 19. Chums sampled: 15 males/6 females for ASL. |
| | 25 Sep | 1 | 66 | 66 | | | | | Rkm 19. Chums sampled: 7 males/14 females for ASL. |
| | Total | 15 | 158 | 168 | 11 | 2 | 0 | 1 | |
| 1991 | 15 Aug | 1 | | | 7 | | 1 | | Rkm 19. |
| | 29 Aug | 3 | 2 | | 5 | | | 2 | Rkm 19. Clear water scared fish. |
| | 03 Sep | 1 | 3 | 18 | 3 | | | | Rkm 19. All chums sampled for ASL. |
| | 10 Sep | 1 | 82 | 91 | | | | | Rkm 19. Chums sampled: 38 males/33 females for ASL. |
| | 13 Sep | 3 | 19 | 5 | 10 | | 1 | | Rkm 19. All chums sampled for ASL. |
| | 16 Sep | 1 | 65 | 67 | 17 | | | | Rkm 19. Chums sampled: 11 males/9 females for ASL. |
| | 18 Sep | 1 | 19 | 35 | 7 | | | | Rkm 19. Chums sampled: 12 males/10 females for ASL. |
| | Total | 11 | 190 | 216 | 49 | 0 | 2 | 2 | |
| 1992 | 06 Sep | 1 | 6 | 3 | 2 | | 1 | 1 | Rkm 10. All chums sampled for ASL. |
| | 08 Sep | 4 | 11 | 11 | 6 | | 3 | | Rkm 10. All chums sampled for ASL and GSI. |
| | 09 Sep | 6 | 12 | 15 | 4 | 1 | 2 | | Rkm 10. All chums sampled for ASL and GSI. |
| | 09 Sep | 1 | 21 | 30 | 2 | | | | Rkm 19. All chums sampled for ASL and GSI. |
| | 14 Sep | 1 | 14 | 15 | | | | | Rkm 10. All chums sampled for ASL. |
| | Total | 13 | 64 | 74 | 14 | 1 | 6 | 1 | |

[a] Abbreviations are ASL (age, sex, length) and GSI (genetic stock identification).

Table 6. Comparative age and sex composition of fall chum salmon sampled by beach seine in the lower Sheenjek River, 1988–1992.

| Year | Age 0.2 | Age 0.3 | Age 0.4 | Age 0.5 | Sample Size | Male:Female Ratio of Age Sample | Total Fish Collected | Male:Female Ratio of Fish Collected |
|---|---|---|---|---|---|---|---|---|
| 1988 [a] | 0.025 | 0.683 | 0.292 | 0.000 | 120 | 1.00:4.30 | 122 | 1.00:4.55 |
| 1989 | 0.052 | 0.766 | 0.169 | 0.013 | 154 | 1.00:1.44 | 340 | 1.00:1.31 |
| 1990 | 0.028 | 0.706 | 0.252 | 0.014 | 143 | 1.00:0.95 | 326 | 1.00:1.06 |
| 1991 | 0.000 | 0.592 | 0.395 | 0.014 | 147 | 1.00:0.77 | 406 | 1.00:1.14 |
| 1992 | 0.000 | 0.179 | 0.806 | 0.015 | 134 | 1.00:1.13 | 138 | 1.00:1.16 |

[a] Escapement samples were predominantly taken near the end of the run. Total includes 7 chum salmon carcass samples (3 males, 4 females).

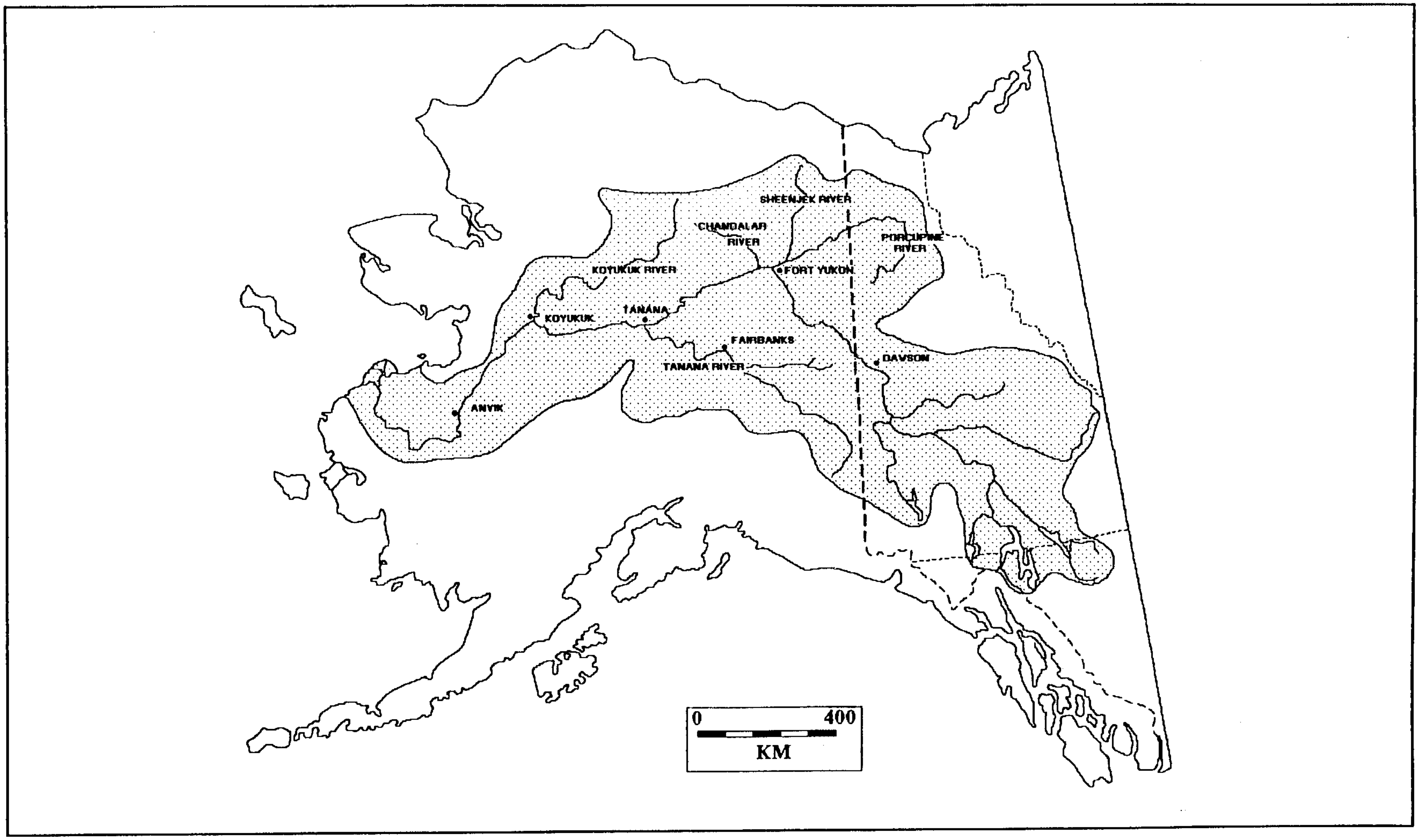


Figure 1. Yukon River drainage showing selected locations.

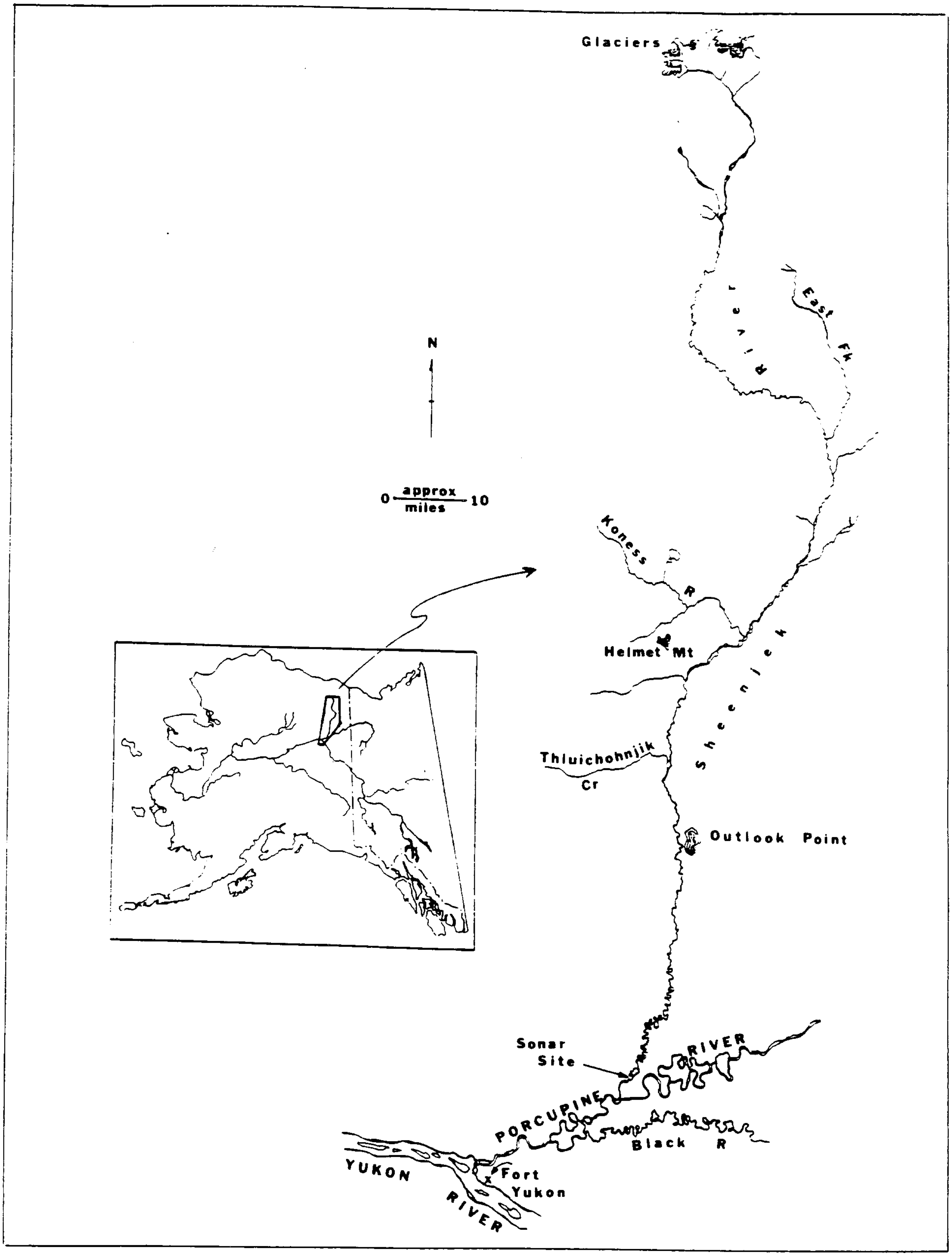


Figure 2. Sheenjek River drainage.

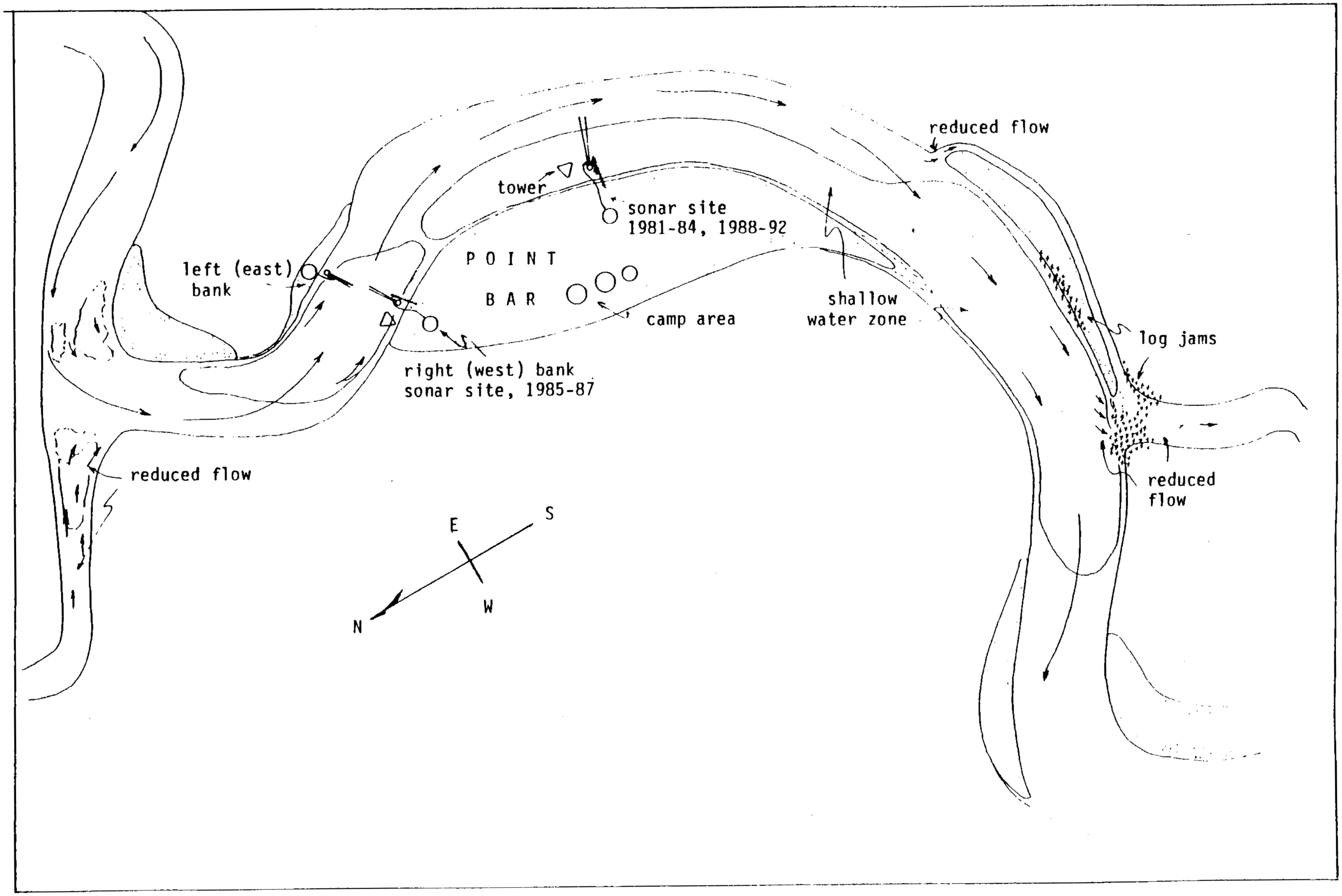


Figure 3. Sheenjek River sonar project site.

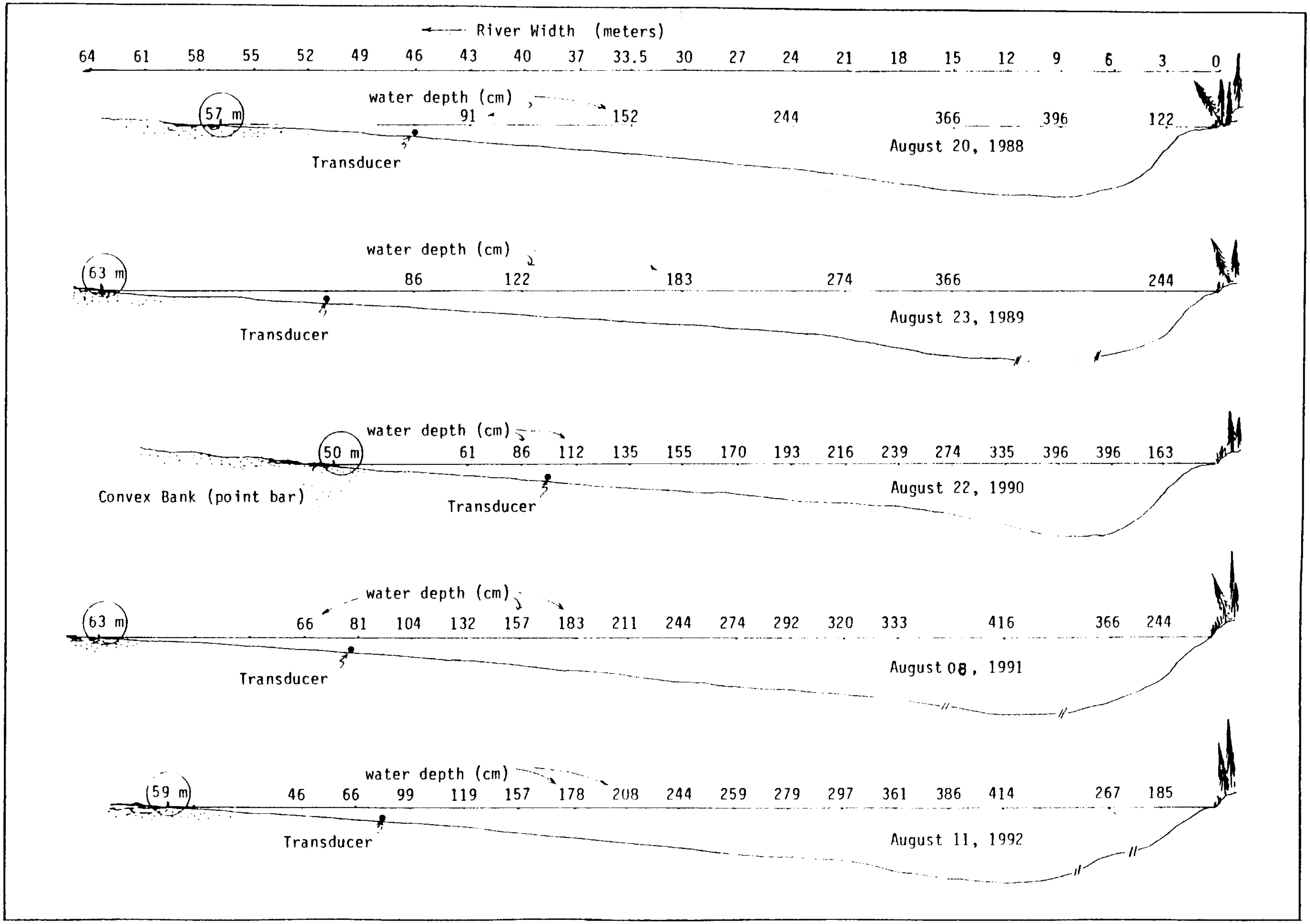


Figure 4. Depth profiles made on selected dates at the Sheenjek River project site, 1988–1992.

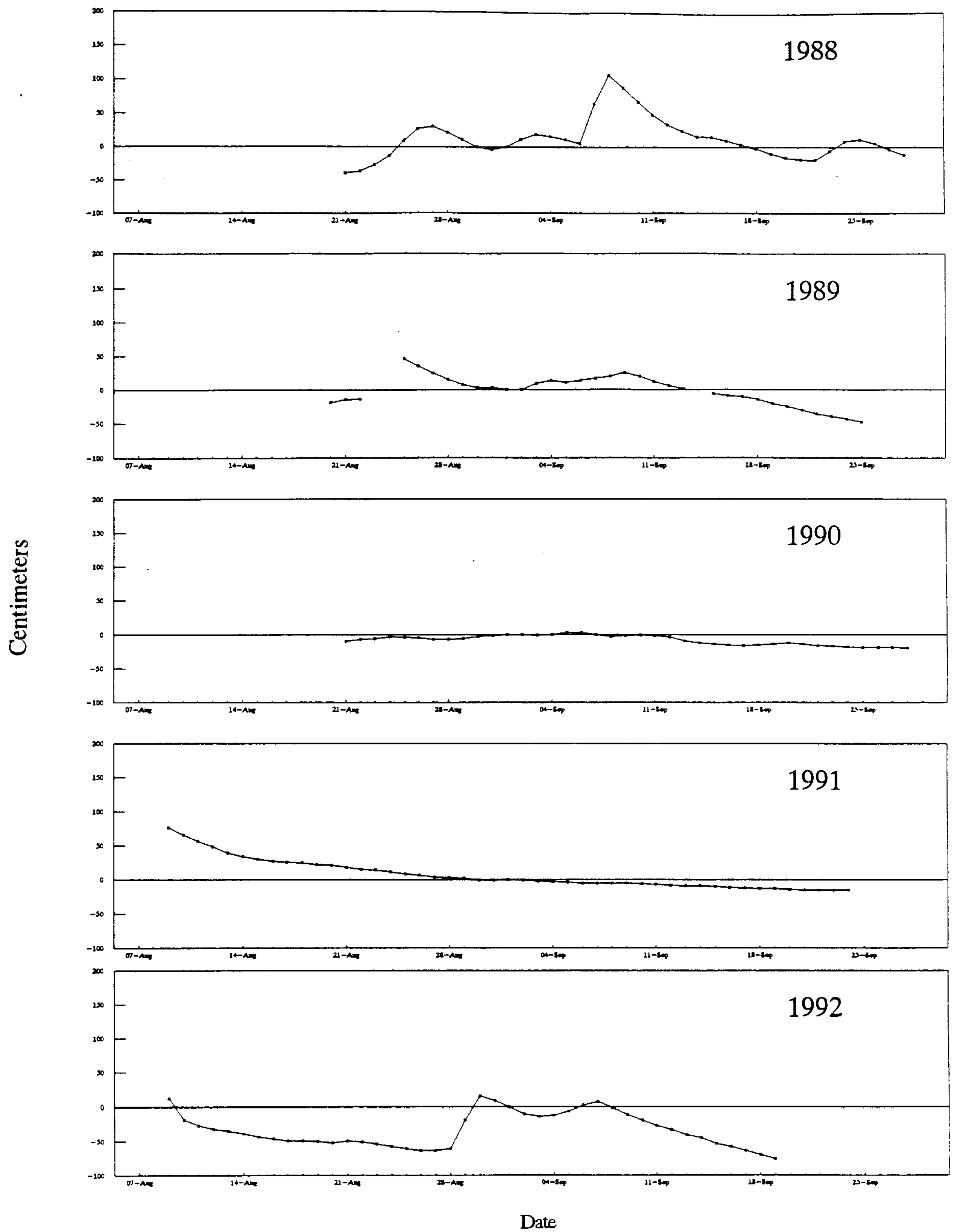


Figure 5. Water depth relative to 1 September, measured at approximately noon daily at the Sheenjek River sonar project site, 1988–1992.

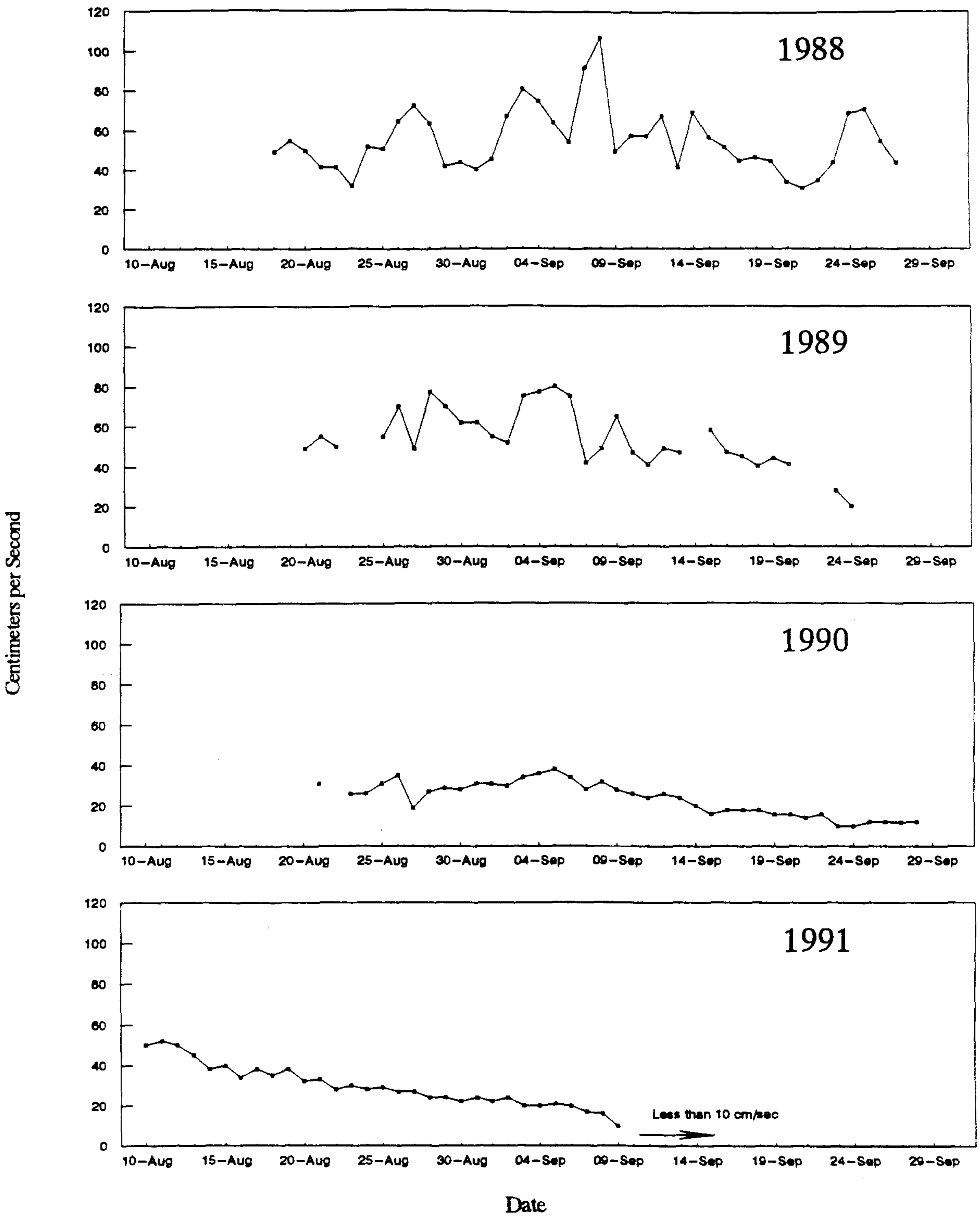


Figure 6. Instantaneous surface water velocity measured across the sonar transducer at the Sheenjek River sonar project site, 1988–1991.

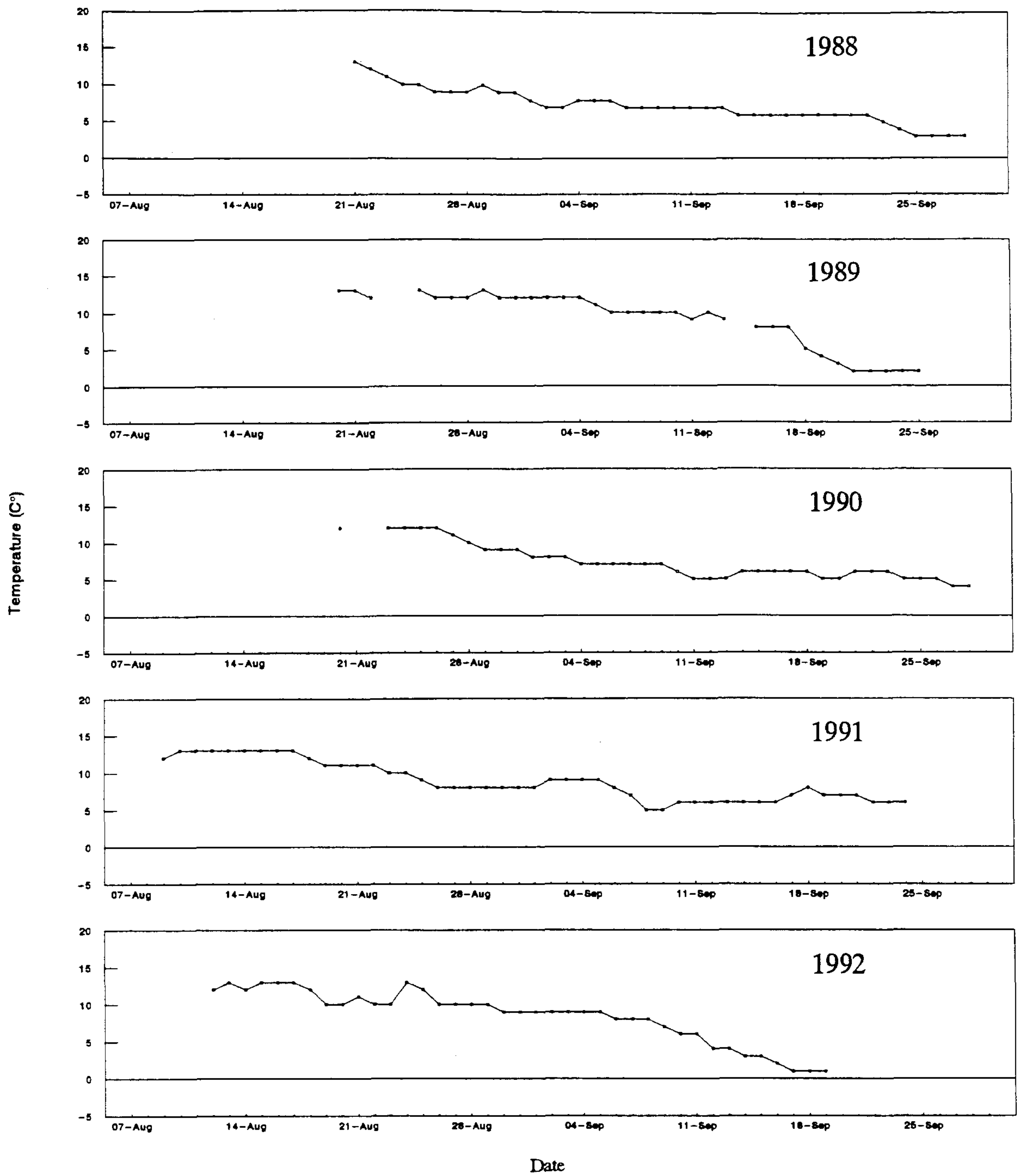


Figure 7. Instantaneous surface water temperature measured at the Sheenjek River sonar project site, 1988–1992.

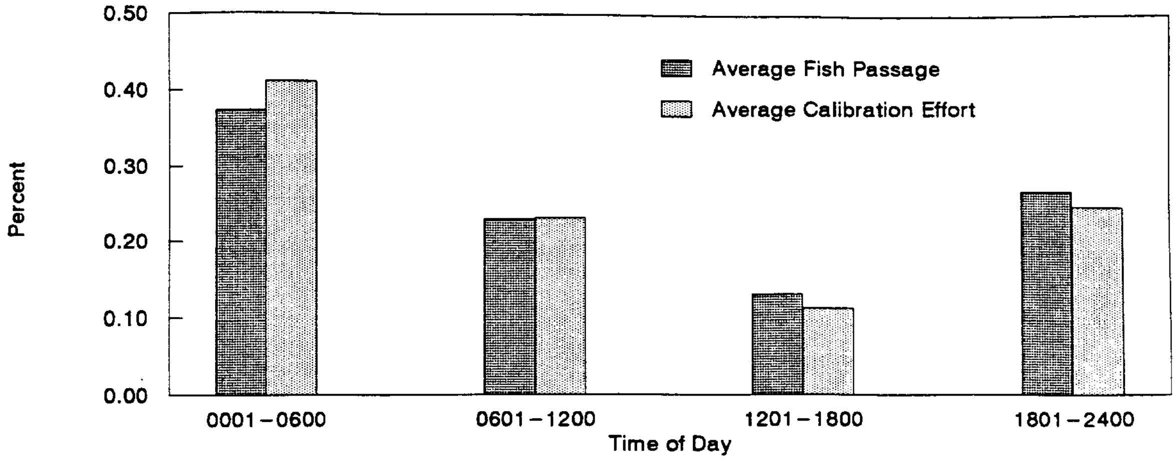


Figure 8. Comparative average daily percent salmon passage versus average daily percent calibration effort in the Sheenjek River, 1988–1992.

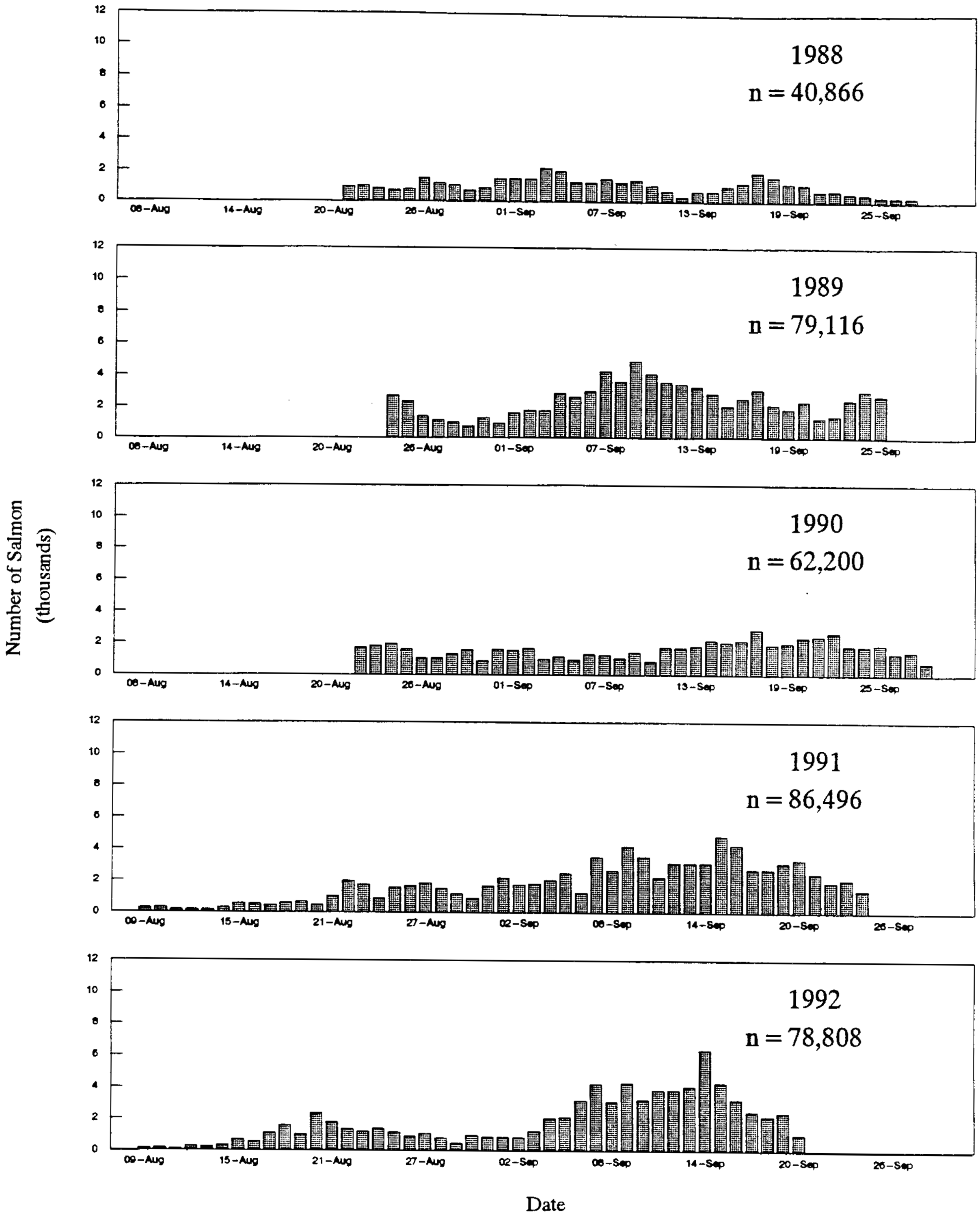


Figure 9. Sheenjek River fall chum salmon run timing based upon sonar-estimated daily passage, 1988–1992.

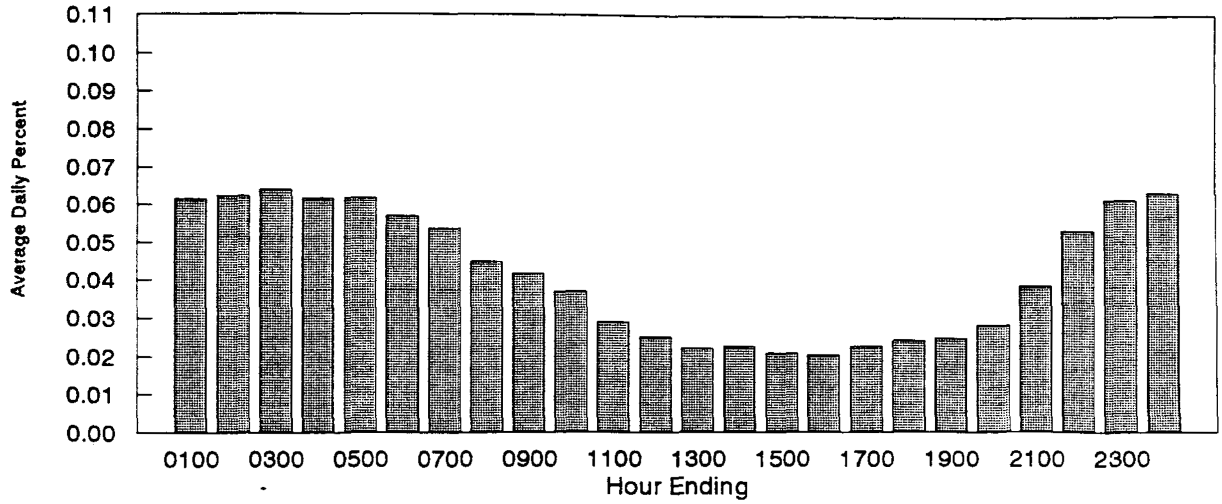


Figure 10. Average temporal migration pattern of fall chum salmon observed in the Sheenjek River, 1988–1992.

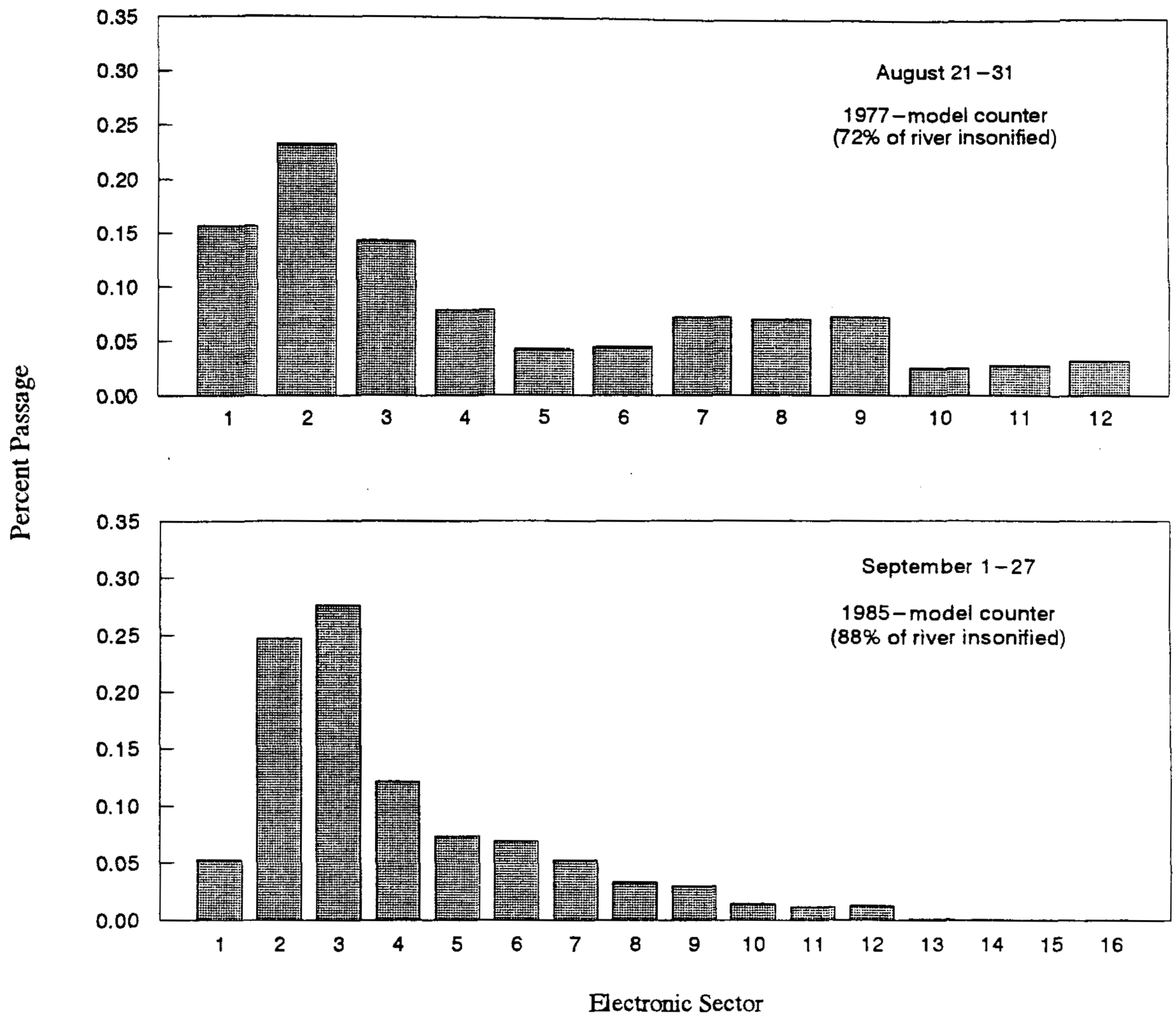


Figure 11. Estimated average percent passage of fall chum salmon in the Sheenjek River by electronic sector in August 1988, using a 1977-model sonar counter (top), and in September 1988, using a 1985-model sonar counter (bottom).

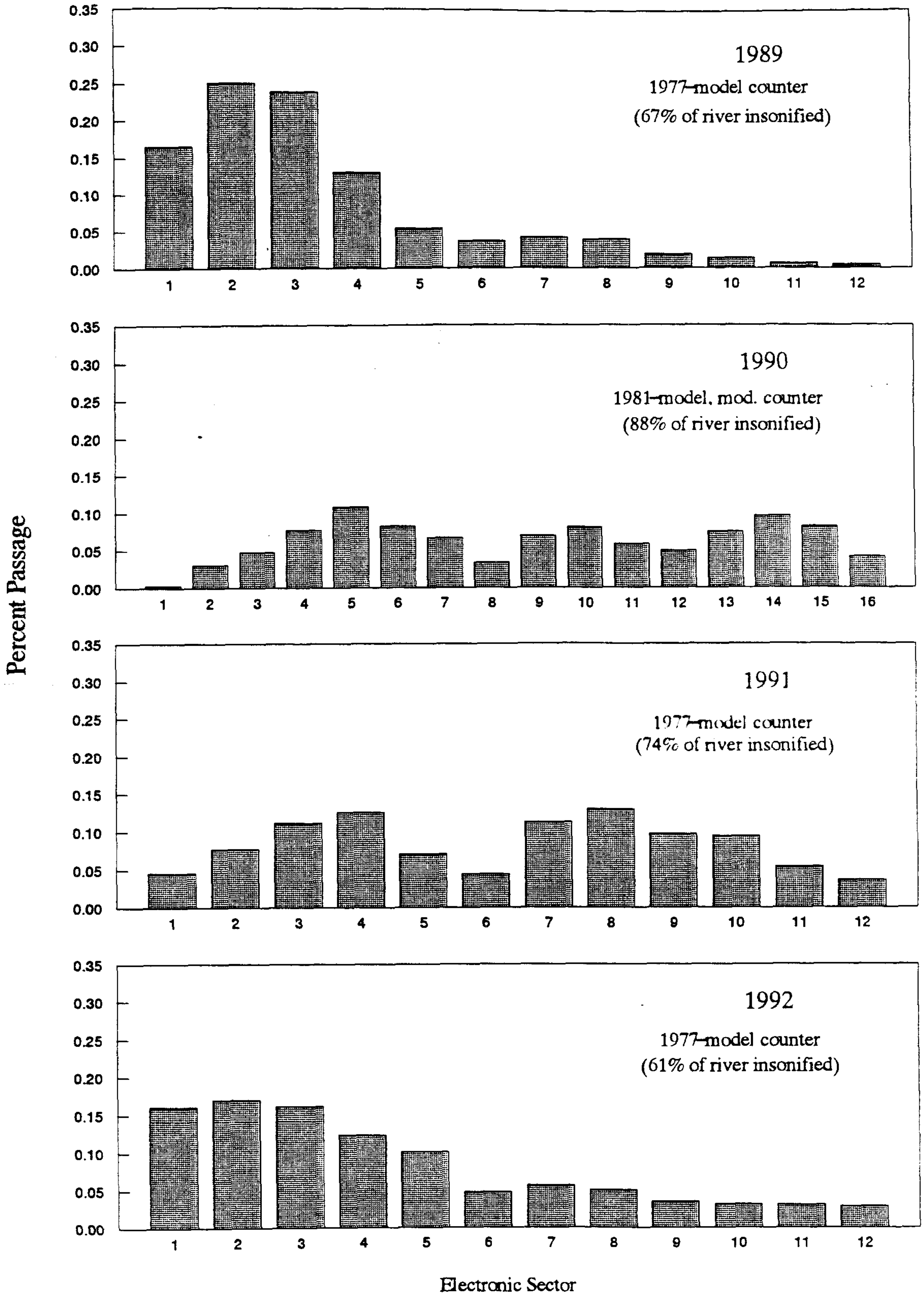


Figure 12. Estimated average percent passage of fall chum salmon in the Sheenjek River by electronic sector, 1989–1992.

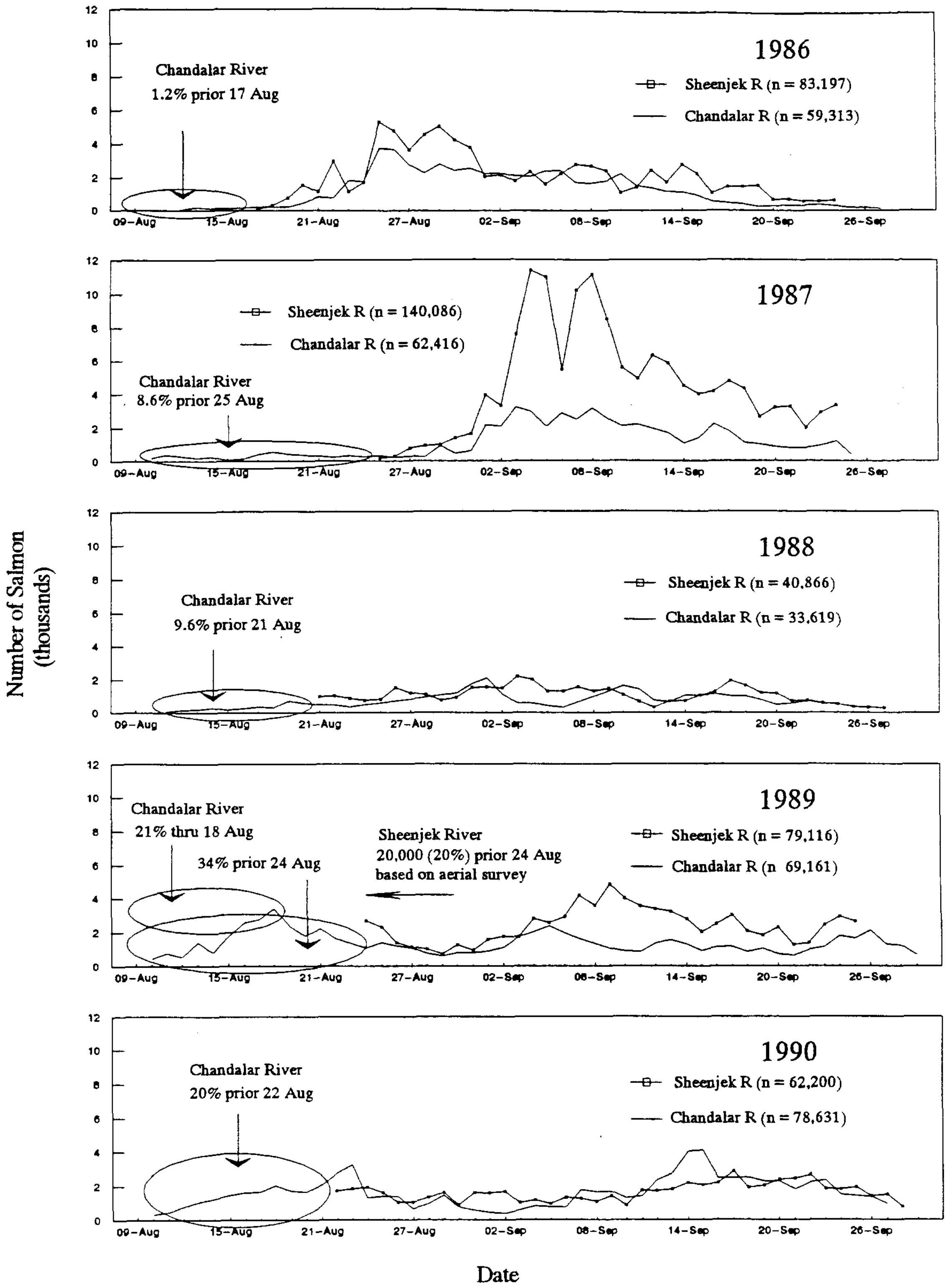


Figure 13. Comparative fall chum salmon entry patterns in the Sheenjek and Chandalar Rivers based upon estimated daily sonar passage, 1986–1990.

## APPENDIX

Appendix A.1. Climatological and hydrological observations made at the Sheenjek River project site, 1988.

| Date | Time | Precipitation (code)[a] | Cloud Cover (code)[b] | Wind (Direction and Velocity) | Temperature: Air °C | Temperature: Water Surface °C | Water Gauge: Actual (cm) | Water Gauge: Relative (cm) | Surface Water Velocity Cm/Sec (cps) | Water Color (code)[c] | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 Aug | | | | | | | | | | | Relocate to project site. |
| 19 Aug | | | | | | | | | | | Camp setup; killed DLP black bear. |
| 20 Aug | | | | | | | | | | | Made river profiles. |
| 21 Aug | 1300 | A | B | S 5 | 18 | 13 | 15 | 0 | 42 | A-B | Installed sonar counter. |
| 22 Aug | 1210 | B | O | S 5 | 13 | 12 | 18 | 3 | 42 | A-B | River rising; some debris. |
| 23 Aug | 1500 | B | C | SW 7 | 17 | 11 | 27 | 9 | 32 | B-C | Windy; standing waves on river; water rising. |
| 24 Aug | 1130 | B | B | SW 10 | 14 | 10 | 40 | 13 | 52 | B-C | |
| 25 Aug | 1500 | A | B | NE 5 | 18 | 10 | 64 | 24 | 51 | D | |
| 26 Aug | 1200 | A | C | S 3 | 16 | 9 | 81 | 17 | 65 | D | |
| 27 Aug | 1200 | B | C | Calm | 19 | 9 | 85 | 4 | 73 | D | |
| 28 Aug | 1200 | B | O | N 5 | 14 | 9 | 76 | -9 | 64 | D | |
| 29 Aug | 1142 | B | C | Calm | 15 | 10 | 65 | -11 | 43 | C | |
| 30 Aug | 1300 | C | O | N 5-8 | 7 | 9 | 54 | -11 | 45 | C | |
| 31 Aug | 1530 | A | O | N 5-8 | 9 | 9 | 50 | -4 | 41 | B | Switched from 1977 to 1985 model counter. |
| 01 Sep | 1230 | A | A | N 5 | 6 | 8 | 54 | 4 | 46 | B | |
| 02 Sep | 1130 | A | B | SW 5 | 11 | 7 | 65 | 11 | 68 | C | |
| 03 Sep | 1215 | A | B | NE 3 | 19 | 7 | 73 | 8 | 82 | C | |
| 04 Sep | 1230 | B | O | Calm | 10 | 8 | 70 | -3 | 76 | C | |
| 05 Sep | 1230 | A | C | S 5 | 13 | 8 | 65 | -5 | 65 | B | |
| 06 Sep | 1130 | B | C | S 3 | 10 | 8 | 59 | -6 | 55 | B | |
| 07 Sep | 1200 | A | B | NE 3 | 18 | 7 | 119 | 60 | 92 | C | Water rising at rate of 1 inch/hour. |
| 08 Sep | 1200 | A | B | N 3 | 17 | 7 | 163 | 44 | 107 | C | River crested but swollen and full of debris. |
| 09 Sep | 1130 | B | B | Calm | 13 | 7 | 144 | -19 | 50 | C | |
| 10 Sep | 1145 | A | B | NE 7 | 10 | 7 | 122 | -22 | 58 | C | |
| 11 Sep | 1300 | B | C | Calm | 11 | 7 | 103 | -19 | 58 | C | |
| 12 Sep | 1530 | B | B | N 3 | 14 | 7 | 88 | -15 | 68 | C | |
| 13 Sep | 1200 | B | B | N 7 | 11 | 7 | 78 | -10 | 42 | B | |
| 14 Sep | 1130 | A | E | Calm | 3 | 6 | 70 | -8 | 70 | B | |
| 15 Sep | 1130 | A | A | S 3 | 10 | 6 | 69 | -1 | 57 | B | |
| 16 Sep | 1200 | A | A | Calm | 16 | 6 | 64 | -5 | 52 | B | Jumpers observed along front of bar. |
| 17 Sep | 1200 | A | A | Calm | 12 | 6 | 58 | -6 | 45 | B | |
| 18 Sep | 1200 | A | B | Calm | 10 | 6 | 52 | -6 | 47 | B | |
| 19 Sep | 1230 | A | B | NE 4 | 12 | 6 | 44 | -8 | 45 | B | |
| 20 Sep | 2030 | B | B | N 3-4 | | 6 | 38 | -6 | 34 | B | |
| 21 Sep | 1045 | B | C | Calm | 6 | 6 | 35 | -3 | 31 | B | |
| 22 Sep | 1230 | B | A | Calm | 5 | 6 | 34 | -1 | 35 | B | |
| 23 Sep | 1230 | A | C | Calm | 5 | 5 | 48 | 14 | 44 | B | |
| 24 Sep | 1200 | A | O | Calm | 2 | 4 | 62 | 14 | 69 | B | |
| 25 Sep | 1130 | A | O | Calm | 2 | 3 | 65 | 3 | 71 | B | Gravel bar freezing; ice in sheltered slack water. |
| 26 Sep | 1130 | E | O | Calm | 1 | 3 | 59 | -6 | 55 | D | First snowflakes. |
| 27 Sep | 1130 | A | C | Calm | 2 | 3 | 50 | -9 | 44 | D | |
| 28 Sep | 1200 | A | A | Calm | -4 | 3 | 42 | -8 | | B | It was 14°F at 0800 hours. |
| Average | | | | | 11 | 7 | | | 56 | | |

[a] Precipitation code for the preceding 24-hour period: A = None; B = Intermittent rain; C = Continuous rain; D = Snow and rain mixed; E = Light snowfall; F = Continuous snowfall; G = Thunderstorm w/ or w/o precipitation

[b] Instantaneous cloud cover code: C = Clear and visibility unlimited (CAVU), S = Scattered (<60%); B = Broken (60–90%); O = Overcast (100%); F = Fog or thick haze or smoke.

[c] Instantaneous water color code: A = Clear; B = Slightly murky or glacial; C = Moderately murky or glacial; D = Heavily murky or glacial; E = Brown, tanic acid stain.

Appendix A.2. Climatological and hydrological observations made at the Sheenjek River project site, 1989.

| Date | Time | Precipitation (code)[a] | Cloud Cover (code)[b] | Wind (Direction and Velocity) | Temperature: Air °C | Temperature: Water Surface °C | Water Gauge: Actual (cm) | Water Gauge: Relative (cm) | Surface Water Velocity Cm/Sec (cps) | Water Color (code)[c] | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 Aug | 1200 | B | S | SSW 5 | 16 | 13 | 15 | 0 | 49 | A | Relocate to project site. |
| 21 Aug | 1215 | B | O | NE 3 | 9 | 13 | 20 | 5 | 55 | A | Camp setup. |
| 22 Aug | 1215 | A | C | Calm | 15 | 12 | 21 | 1 | 50 | A | Made several river profiles. |
| 23 Aug | | | | | | | | | | | Made several river profiles; installed sonar counter. |
| 24 Aug | | | | | | | | | | | Lots of debris in river from high water. |
| 25 Aug | 1315 | A | B | NE 3-5 | 21 | 13 | 80 | 59 | 55 | D | |
| 26 Aug | 1300 | A | B | Calm | 21 | 12 | 70 | -10 | 70 | C | High overcast burning off. |
| 27 Aug | 1300 | B | O | Calm | 17 | 12 | 59 | -11 | 49 | B | |
| 28 Aug | 1400 | A | B | Calm | 21 | 12 | 50 | -9 | 77 | A | |
| 29 Aug | 1200 | A | O | S 3 | 18 | 13 | 42 | -8 | 70 | A | |
| 30 Aug | 1230 | B,G | O | Calm | 14 | 12 | 37 | -5 | 62 | A | Lightning to the east. |
| 31 Aug | 1230 | B | C | Calm | 15 | 12 | 37 | 0 | 62 | A | Thunderstorm moving in from SE; Black bear in camp. |
| 01 Sep | 1230 | B,G | C | Calm | 16 | 12 | 34 | -3 | 55 | A | |
| 02 Sep | 1245 | B | B | Calm | 16 | 12 | 34 | 0 | 52 | A | |
| 03 Sep | 1215 | B | C | Calm | 14 | 12 | 43 | 9 | 75 | A | |
| 04 Sep | 1230 | B | S | Calm | 17 | 12 | 48 | 5 | 77 | B | |
| 05 Sep | 1230 | B | O | Calm | 11 | 11 | 45 | -3 | 80 | B | Removed a tree from weir. |
| 06 Sep | 1210 | B | S | SW 8 | 14 | 10 | 48 | 3 | 75 | B | Lots of beaver cuttings floating down river. |
| 07 Sep | 1245 | A | O | E 3 | 9 | 10 | 51 | 3 | 42 | A | |
| 08 Sep | 1300 | A | B | Calm | 11 | 10 | 54 | 3 | 49 | A | Some fish holding in beam. |
| 09 Sep | 1300 | A | B | Calm | 19 | 10 | 59 | 5 | 65 | B | River debris heavy: fallen leaves and beaver cuttings. |
| 10 Sep | 1230 | B | S | Calm | 19 | 10 | 54 | -5 | 47 | B | |
| 11 Sep | 1230 | B | O | Calm | 12 | 9 | 46 | -8 | 41 | B | Completely overcast with no stars or moon. |
| 12 Sep | 1230 | B | S | S 3 | 13 | 10 | 40 | -6 | 49 | B | |
| 13 Sep | 1145 | A | B | S 7 | 12 | 9 | 36 | -4 | 47 | B | Wolves howling and move through on east bank. |
| 14 Sep | | | | | | | | | | | |
| 15 Sep | 1215 | A | C | Calm | 5 | 8 | 28 | -8 | 58 | A | Shore ice present (21°F); moon brighter than flashlight. |
| 16 Sep | 1230 | A | C | Calm | 7 | 8 | 25 | -3 | 47 | A | It was 19°F at 0600 hours. |
| 17 Sep | 1230 | A | C | N 4 | 4 | 8 | 24 | -1 | 45 | A | Moon is casting shadows. |
| 18 Sep | 1230 | A | C | Calm | 3 | 5 | 20 | -4 | 40 | A | Holding/milling. |
| 19 Sep | 1300 | A | C | NE 3 | 3 | 4 | 14 | -6 | 44 | A | Holding/milling. |
| 20 Sep | 1200 | A | C | NE 15 | -1 | 3 | 9 | -5 | 41 | A | Windy w/ gusts to 25 mph. |
| 21 Sep | 1230 | A | O | NE 15 | -2 | 2 | 4 | -5 | | A | Salmon paired and holding. |
| 22 Sep | 1230 | E | O | Calm | 0 | 2 | -1 | -5 | | A | Walked bar; 200–300 chums holding. |
| 23 Sep | 1330 | E | B | Calm | 3 | 2 | 5 | -4 | 28 | A | Holding/milling. |
| 24 Sep | 1230 | B | B | N 12 | 6 | 2 | -9 | -4 | 20 | B | Windy w/ gusts to 20–25 mph. |
| 25 Sep | 1200 | B | S | Calm | 6 | 2 | -13 | -4 | | | |
| Average | | | | | 11 | 9 | | | 54 | | |

[a] Precipitation code for the preceding 24-hour period: A = None; B = Intermittent rain; C = Continuous rain; D = Snow and rain mixed; E = Light snowfall; F = Continuous snowfall; G = Thunderstorm w/ or w/o precipitation

[b] Instantaneous cloud cover code: C = Clear and visibility unlimited (CAVU), S = Scattered (<60%), B = Broken (60–90%); O = Overcast (100%); F = Fog or thick haze or smoke.

[c] Instantaneous water color code: A = Clear; B = Slightly murky or glacial; C = Moderately murky or glacial; D = Heavily murky or glacial; E = Brown, tanic acid stain.

Appendix A.3. Climatological and hydrological observations made at the Sheenjek River project site, 1990.

| Date | Time | Precipitation (code)[a] | Cloud Cover (code)[b] | Wind (Direction and Velocity) | Temperature Air °C | Temperature Water Surface °C | Water Gauge Actual (cm) | Water Gauge Relative (cm) | Surface Water Velocity Cm/Sec (cps) | Water Color (code)[c] | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 Aug | | A | | | 17 | 12 | | | | | Relocate to project site. |
| 21 Aug | 1315 | A | C | S 3 | | | 15 | 0 | 31 | A | Camp setup. |
| 22 Aug | | | | | | | 18 | 3 | | A | Made several river profiles; installed sonar counter. |
| 23 Aug | 1224 | A | S | Calm | 18 | 12 | 19 | 1 | 26 | A | Schools of 15–25 chums barely moving upstream. |
| 24 Aug | 1200 | A | S | S 10 | 16 | 12 | 22 | 3 | 26 | A | |
| 25 Aug | 1500 | A | S | Calm | 18 | 12 | 21 | -1 | 31 | A | |
| 26 Aug | 1215 | C | O | S 4 | 15 | 12 | 20 | -1 | 35 | A | |
| 27 Aug | 1245 | B | S | S 20-25 | 12 | 11 | 18 | -2 | 19 | A | Very windy; surface water not moving much; stormy |
| 28 Aug | 1320 | A | S | S 15-20 | 12 | 10 | 18 | 0 | 27 | A | for past 24 hours; fish holding problems. |
| 29 Aug | 1250 | A | S | S 10 | 12 | 9 | 19 | 1 | 29 | A | |
| 30 Aug | 1205 | A | O | S 5 | 11 | 9 | 22 | 3 | 28 | A | |
| 31 Aug | 1220 | B | O | S 5-10 | 13 | 9 | 23 | 1 | 31 | A | |
| 01 Sep | 1220 | A | C | N 3-5 | 9 | 8 | 25 | 2 | 31 | A | Replaced receiver card. |
| 02 Sep | 1245 | A | C | N 5 | 7 | 8 | 25 | 0 | 30 | A | Fish holding problems. |
| 03 Sep | 1200 | A | O | N 5 | 7 | 8 | 24 | -1 | 34 | A | Holding; observed approx 200 chums holding. |
| 04 Sep | 1250 | A | O | Calm | 10 | 7 | 25 | 1 | 36 | A | Fish holding problems. |
| 05 Sep | 1225 | B | O | S 5 | 10 | 7 | 28 | 3 | 38 | A | Fish holding/milling above and below weir. |
| 06 Sep | 1200 | B | O | S 20-30 | 10 | 7 | 28 | 0 | 34 | A | Strong winds; up to 10 in wave action on river. With |
| 07 Sep | 1245 | B | O | S 10-15 | 8 | 7 | 25 | -3 | 28 | A | exposure of full moon fish began to move. |
| 08 Sep | 1205 | A | S | S 10 | 6 | 7 | 22 | -3 | 32 | A | Fish holding/milling above and below weir. |
| 09 Sep | 1230 | A | C | N 5 | 6 | 7 | 23 | 1 | 28 | A | Fish holding/milling above and below weir. |
| 10 Sep | 1235 | A | C | N 5 | 6 | 6 | 24 | 1 | 26 | A | Severe holding problems. |
| 11 Sep | 1200 | A | C | S 10-15 | 5 | 5 | 23 | -1 | 24 | A | Fish holding problems. |
| 12 Sep | 1230 | B | O | Calm | 4 | 5 | 21 | -2 | 26 | A | Fish holding problems. |
| 13 Sep | 1235 | B | O | Calm | 8 | 5 | 16 | -5 | 24 | A | Fish holding problems. |
| 14 Sep | 1240 | B | O | Calm | 11 | 6 | 13 | -3 | 20 | A | |
| 15 Sep | 1145 | B | B | S 10-15 | 9 | 6 | 11 | -2 | 16 | A | |
| 16 Sep | 1135 | A | S | S 5-10 | 6 | 6 | 10 | -1 | 18 | A | |
| 17 Sep | 1200 | A | S | N 10-15 | 8 | 6 | 9 | -1 | 18 | A | |
| 18 Sep | 1300 | A | S | N 5 | 9 | 6 | 10 | 1 | 18 | A | Fish holding the length of the bar. |
| 19 Sep | 1400 | A | S | N 5 | 10 | 5 | 11 | 1 | 16 | A | |
| 20 Sep | 1240 | B | O | Calm | | 5 | 13 | 2 | 16 | A | |
| 21 Sep | 1245 | A | O | S 5 | 6 | 6 | 11 | -2 | 14 | A | |
| 22 Sep | 1235 | B | O | N 5 | 5 | 6 | 9 | -2 | 16 | A | Holding. |
| 23 Sep | 1315 | B | O | S 15 | 5 | 6 | 8 | -1 | 10 | A | Very windy; surface water not moving much. |
| 24 Sep | 1300 | A | S | S 15 | 2 | 5 | 7 | -1 | 10 | A | Very windy; surface water not moving much. |
| 25 Sep | 1200 | A | S | S 5 | 2 | 5 | 6 | -1 | 12 | A | Holding problems. |
| 26 Sep | 1215 | A | O | Calm | 1 | 5 | 6 | 0 | 12 | A | Fish holding/milling above and below weir. |
| 27 Sep | 1215 | A | O | N 5-10 | 2 | 4 | 6 | 0 | 12 | A | Holding problems, fish visible length of bar. |
| 28 Sep | 1200 | A | O | N 10-15 | -4 | 4 | 5 | -1 | 12 | A | Holding problems. |
| Average | | | | | 8 | 7 | | | 24 | | |

[a] Precipitation code for the preceding 24-hour period: A = None; B = Intermittent rain; C = Continuous rain; D = Snow and rain mixed; E = Light snowfall; F = Continuous snowfall; G = Thunderstorm w/ or w/o precipitation.

[b] Instantaneous cloud cover code: C = Clear and visibility unlimited (CAVU); S = Scattered (<60%); B = Broken (60–90%); O = Overcast (100%); F = Fog or thick haze or smoke.

[c] Instantaneous water color code: A = Clear; B = Slightly murky or glacial; C = Moderately murky or glacial; D = Heavily murky or glacial; E = Brown, tanic acid stain.

Appendix A.4. Climatological and hydrological observations made at the Sheenjek River project site, 1991.

| Date | Time | Precipitation (code)[a] | Cloud Cover (code)[b] | Wind (Direction and Velocity) | Temperature Air Min. °C | Temperature Air Max. °C | Temperature Water Surface °C | Water Gauge Actual (cm) | Water Gauge Relative (cm) | Surface Water Velocity Cm/Sec (cps) | Water Color (code)[c] | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07 Aug | | | | | | | | | | | | Relocate to project site and camp setup. |
| 08 Aug | | | | | | | | | | | | Made several river profiles. |
| 09 Aug | 1200 | A | C | SW 5 | | | 12 | 15 | 0 | | D | |
| 10 Aug | 1200 | A | B | SW 5 | 5 | 22 | 13 | 5 | -10 | 50 | C | Balmy. |
| 11 Aug | 1200 | A | B | Light & Variable | 9 | 19 | 13 | -4 | -9 | 52 | C | Balmy. |
| 12 Aug | 1430 | A | C | Slight | 9 | 29 | 13 | -13 | -9 | 50 | C | |
| 13 Aug | 1250 | G | C | Slight | 7 | 28 | 13 | -22 | -9 | 45 | B | Sighted jumpers across river, head of bar. Black sow |
| 14 Aug | 1215 | B | S | Slight | 12 | 23 | 13 | -27 | -5 | 38 | B | with 2 cubs across river; 4th bear on upper end bar. |
| 15 Aug | 1440 | A | C | Slight | 8 | 23 | 13 | -31 | -4 | 40 | B | USFWS arrives at site. |
| 16 Aug | 1230 | A | S | S 10 | 12 | 23 | 13 | -34 | -3 | 34 | B-A | Windy. |
| 17 Aug | 1300 | A | O | N 2 | 8 | 18 | 13 | -35 | -1 | 38 | B-A | Black bear attempts to enter storage tent. |
| 18 Aug | 1300 | B | C | E-NE 3-5 | 6 | 16 | 12 | -36 | -1 | 35 | B-A | Black bear seen again this evening on bar. |
| 19 Aug | 1400 | A | C | Light & Variable | 1 | 17 | 11 | -39 | -3 | 38 | B-A | Black bear attempts to raid buried cooler. |
| 20 Aug | 1320 | A | C | SW 2-3 | 0 | 22 | 11 | -40 | -1 | 32 | B-A | |
| 21 Aug | 1315 | A | C | S 3-5 | 1 | 22 | 11 | -43 | -3 | 33 | A-B | |
| 22 Aug | 1500 | A | B | SW 10-15 | 11 | 16 | 11 | -46 | -3 | 28 | B | High winds - blowing silt; standing waves on river; |
| 23 Aug | 1415 | B | O | S 3-4 | 8 | 14 | 10 | -47 | -1 | 30 | B | surge of fish may have been pushed upriver. |
| 24 Aug | 1400 | B | C | N 2-3 | 1 | 12 | 10 | -50 | -3 | 28 | A-B | Fish holding/milling problems. |
| 25 Aug | 1400 | A | S | N 15-20 | -1 | 8 | 9 | -53 | -3 | 29 | B | High winds & unseasonally cold. |
| 26 Aug | 1500 | A | C | N 15-20 | 0 | 9 | 8 | -54 | -1 | 27 | B | High winds; clear and cold; fish holding/milling. |
| 27 Aug | 1430 | A | C | N 10 | 0 | 15 | 8 | -57 | -3 | 27 | B | Windy; fish line the bar with no movement. |
| 28 Aug | 1530 | A | C | N 3-5 | -2 | 13 | 8 | -58 | -1 | 24 | A-B | USFWS departs site. |
| 29 Aug | 1400 | A | C | Variable 2-4 | -2 | 15 | 8 | -59 | -1 | 24 | A-B | |
| 30 Aug | 1830 | A | C-F | N 4-5 | 0 | 20 | 8 | -62 | -3 | 22 | A-B | Lots of smoke this AM from wildfire. |
| 31 Aug | 1300 | A | C | S 3-5 | 0 | 11 | 8 | -62 | 0 | 24 | A-B | Jumpers observed above and below sonar site. |
| 01 Sep | 1345 | A | O | S 3-5 | -1 | 12 | 8 | -61 | 1 | 22 | A | Last of the season's black flies and no-see-ums are |
| 02 Sep | 1515 | A | C | N 2-4 | -1 | 19 | 9 | -62 | -1 | 24 | A-B | out in force. |
| 03 Sep | 1300 | A | C | Variable 2-3 | 0 | 16 | 9 | -63 | -1 | 20 | A-B | Clear areas scattered along bottom from holding fish. |
| 04 Sep | 1400 | A | C | N 3-4 | 6 | 19 | 9 | -64 | -1 | 20 | A-B | |
| 05 Sep | 1315 | A | C-F | N 20 | 6 | 20 | 9 | -65 | -1 | 21 | A-B | Very windy; heavy smoke with some fly ash. |
| 06 Sep | 1430 | A | C | N 10 | 1 | 10 | 8 | -66 | -1 | 20 | A-B | Wind howling. |
| 07 Sep | 1400 | A | C | N 5-10 | -2 | 7 | 7 | -66 | 0 | 17 | A-B | Severe holding. |
| 08 Sep | 1310 | A | O-F | N 5-10 | 1 | 15 | 5 | -66 | 0 | 16 | A-B | Extremely smokey; river filled with leaves. |
| 09 Sep | 1425 | D | O-F | Calm | 2 | 7 | 5 | -66 | 0 | 10 | A-B | Hundreds of fish holding along entire bar. |
| 10 Sep | 1300 | A | C | N 2-5 | 1 | 8 | 6 | -67 | -1 | <10 | A-B | |
| 11 Sep | 1230 | A | S | N 15-20 | 3 | 10 | 6 | -68 | -1 | <10 | A-B | |
| 12 Sep | 1210 | A | O | N 10-15 | 4 | 16 | 6 | -69 | -1 | <10 | A-B | |
| 13 Sep | 1200 | B | O | N 5 | 2 | 7 | 6 | -70 | -1 | <10 | A-B | |
| 14 Sep | 1245 | A | C-S | N 15-20 | -2 | 6 | 6 | -70 | 0 | <10 | A-B | |
| 15 Sep | 1225 | A | B | N 15 | 3 | 4 | 6 | -71 | -1 | <10 | A-B | |
| 16 Sep | 1130 | A | O | N 15-20 | 4 | 4 | 6 | -72 | -1 | <10 | A-B | Steady fish passage. |
| 17 Sep | 1210 | B | S | Calm | 0 | 4 | 7 | -73 | -1 | <10 | A-B | |
| 18 Sep | 1250 | B | C | S 10-15 | 7 | 17 | 8 | -74 | -1 | <10 | A-B | Run has slowed down. |
| 19 Sep | 1250 | A | C | S 1-2 | -7 | 9 | 7 | -74 | 0 | <10 | A-B | |
| 20 Sep | 1230 | A | O | S 5 | 0 | 14 | 7 | -75 | -1 | <10 | A-B | |
| 21 Sep | 1315 | B | S | S 5 | -1 | 10 | 7 | -76 | -1 | <10 | A-B | Very bright moon and frost. |
| 22 Sep | 1200 | A | C | N 2-5 | -2 | 17 | 6 | -76 | 0 | <10 | A-B | Fish holding. |
| 23 Sep | 1200 | C | O | S 5 | 3 | 9 | 6 | -76 | 0 | <10 | A-B | |
| 24 Sep | 1010 | C | O | Calm | 3 | 9 | 6 | -76 | 0 | <10 | A-B | Wolves howling at full moon, north and west of camp. |
| Average | | | | | 3 | 14 | 9 | | | 20 | | |

[a] Precipitation code for the preceding 24-hour period: A = None; B = Intermittent rain; C = Continuous rain; D = Snow and rain mixed; E = Light snowfall; F = Continuous snowfall; G = Thunderstorm w/ or w/o precipitation.

[b] Instantaneous cloud cover code: C = Clear and visibility unlimited (CAVU); S = Scattered (<60%); B = Broken (60–90%); O = Overcast (100%); F = Fog or thick haze or smoke.

[c] Instantaneous water color code: A = Clear; B = Slightly murky or glacial; C = Moderately murky or glacial; D = Heavily murky or glacial; E = Brown, tannic acid stain.

Appendix A.5. Climatological and hydrological observations made at the Sheenjek River project site, 1992.

| Date | Time | Precipitation (code)[a] | Cloud Cover (code)[b] | Wind (Direction and Velocity) | Temperature Air Min. °C | Temperature Air Max. °C | Temperature Water Surface °C | Water Gauge Actual (cm) | Water Gauge Relative (cm) | Water Color (code)[c] | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 07 Aug | 1515 | A | S | | | | | | | D | Relocate to project site; river high and turbid but falling. |
| 08 Aug | | | | S 5-10 | | | | | | D | Camp setup. |
| 09 Aug | | B | O | S 5-15 | | | | 0 | 0 | C | Made several river profiles; installed sonar counter. |
| 10 Aug | 1430 | A | S | S <5 | | | | -30 | -30 | C | Water dropping rapidly. |
| 11 Aug | 1400 | A | C | S <5 | 8 | 22 | | -39 | -9 | B | Made river profile. |
| 12 Aug | 1430 | A | S | SW 5 | 13 | 20 | 12 | -44 | -5 | B | |
| 13 Aug | 1430 | A | S | Calm | 7 | 15 | 13 | -47 | -3 | B | Distant thunder showers. |
| 14 Aug | 1200 | B | S | SW 10 | 11 | 14 | 12 | -51 | -4 | B | |
| 15 Aug | 1330 | A | C-S | S 5 | 6 | 19 | 13 | -55 | -4 | B | |
| 16 Aug | 1540 | A | C-S | SW 5 | 6 | 19 | 13 | -58 | -3 | B | |
| 17 Aug | 1200 | B | | S 15-25 | 10 | 19 | 13 | -61 | -3 | B | |
| 18 Aug | 1350 | B | C-S | S 5-10 | 6 | 13 | 12 | -61 | 0 | B | Fish holding. |
| 19 Aug | 1200 | B | C-S | S 5-10 | 3 | 13 | 10 | -62 | -1 | B | Fish holding. |
| 20 Aug | 1200 | A | C-S | NE 10 | 3 | 15 | 10 | -64 | -2 | B | Fish holding. |
| 21 Aug | 1200 | A | C | Calm | 9 | 19 | 11 | -61 | 3 | B | |
| 22 Aug | 1223 | B | C | S 5 | 12 | 21 | 10 | -63 | -2 | B | |
| 23 Aug | 1146 | A | C | N 5-10 | 7 | 19 | 10 | -66 | -3 | B | |
| 24 Aug | 1154 | A | C-S | Calm | 12 | 21 | 13 | -70 | -4 | B | |
| 25 Aug | 1140 | C | O | S 5-10 | 12 | 22 | 12 | -73 | -3 | B | |
| 26 Aug | 1200 | B | O | SW 15 | 6 | 17 | 10 | -76 | -3 | B | |
| 27 Aug | 1230 | B | S | SW 5 | 3 | 12 | 10 | -76 | 0 | B | |
| 28 Aug | 1150 | A | S | N 5 | 6 | 16 | 10 | -73 | 3 | B | A pack of wolves howling this PM across river. |
| 29 Aug | 1100 | A | C | Calm | 2 | 16 | 10 | -31 | 42 | D | |
| 30 Aug | 1200 | A | C-S | NE 5-10 | 6 | 14 | 9 | 4 | 35 | D | Wolves howling this AM across river. |
| 31 Aug | 1145 | B | O | NE 5-10 | 7 | 15 | 9 | -3 | -7 | C | |
| 01 Sep | 1145 | B-C | O | SW 5-15 | 8 | 13 | 9 | -12 | -9 | C | Black bear approached mess tent this evening. |
| 02 Sep | 1208 | B | O | SW 5 | 5 | 12 | 9 | -22 | -10 | C | |
| 03 Sep | 1200 | B | B | SW 5 | 8 | 13 | 9 | -26 | -4 | C | Blown generator. |
| 04 Sep | 1148 | A | C-S | N 5 | 4 | 12 | 9 | -24 | 2 | C | Black bear behind mess tent (2300 hours); eyes blue-green when lighted. |
| 05 Sep | 1145 | A | S | N 5-10 | 3 | 14 | 9 | -18 | 6 | C | |
| 06 Sep | 1200 | A | C-S | N 10-15 | 6 | 14 | 8 | -10 | 8 | C | |
| 07 Sep | 1200 | A | C | N 10-25 | 4 | 12 | 8 | -5 | 5 | C | North wind blowing all day and night. |
| 08 Sep | 1315 | A | S | S 5-10 | 2 | 13 | 8 | -13 | -8 | C | |
| 09 Sep | 1220 | A | O | S 5-10 | 6 | 13 | 7 | -23 | -10 | C | Saw some snowflakes. |
| 10 Sep | 1157 | A | C | S 5-10 | -4 | 7 | 6 | -31 | -8 | C | First frost. |
| 11 Sep | 1146 | A | S | S 10-15 | -5 | 5 | 6 | -39 | -8 | B | Fish holding more than milling. |
| 12 Sep | 1254 | E | O | S 5 | -1 | 5 | 4 | -45 | -6 | B | Overcast with flurries; cold. Fish lining bar upstream of camp. |
| 13 Sep | 1220 | E-F | O | SW 5 | -4 | 3 | 4 | -52 | -7 | B | Frost this AM; snow throughout day. Severe holding problems. |
| 14 Sep | 1145 | E | O | NW 5 | -3 | 3 | 3 | -57 | -5 | B | Cold; periodic snow; slough above camp freezing up. Fish lining bar past 3 days. |
| 15 Sep | 1255 | A | C | N 2-5 | -6 | 3 | 3 | -65 | -8 | B | Strange happening last night: North winds up to 40 mph (weather front?), calm by 0600 this AM. Fish holding and milling. |
| 16 Sep | 1152 | A | C | S 2-5 | -8 | 2 | 2 | -70 | -5 | B | |
| 17 Sep | 1139 | A | C | NE10-15 | -7 | 2 | 1 | -76 | -6 | B | Ice floes in river. |
| 18 Sep | 1154 | E | O | N 15-25 | -9 | 6 | 1 | -82 | -6 | B | Windy; snowing sideways; cold; RAW! |
| 19 Sep | 1315 | A | S | N 10-25 | -9 | 3 | 1 | -88 | -6 | B | River running ice; cold and windy. Ice forming on transducer face. |
| Average | | | | | 4 | 13 | 8 | | | | |

[a] Precip code for the preceding 24 hour period: A = None; B = Intermittent rain; C = Continuous rain; D = Snow and rain mixed; E = Light snowfall; F = Continuous snowfall; G = Thunderstorm w/ or w/o precipitation.

[b] Instantaneous [illegible] S = Scattered [illegible]; B = Broken (60-90%); O = Overcast (100%); F = Fog or thick haze or smoke.

[c] Instantaneous [illegible] A = [illegible] B = Slightly murky or glacial; C = Moderately murky or glacial; D = Heavily murky or glacial; E = Brown, tanic acid stain.

Appendix A.6. Oscilloscope calibrations made to the 1977-model and 1985-model (*) sonar counters at the Sheenjek River project site in 1988.

| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 Aug | 2309 | 15 | 29 | 45 | 0.644 | 0.999 | 2.5 | 100 | 102.5 | 116 |
| 21 Aug | 53 | 6 | 17 | 20 | 0.850 | 0.999 | 2.5 | 100 | 102.5 | 170 |
| | 104 | 30 | 59 | 79 | 0.747 | 0.999 | 2.5 | 100 | 102.5 | 118 |
| | 815 | 30 | 14 | 59 | 0.237 | 0.999 | 2.5 | 100 | 102.5 | 28 |
| | 1501 | 15 | 5 | 12 | 0.417 | 0.999 | 2.5 | 100 | 102.5 | 20 |
| | 2044 | 15 | 5 | 0 | -- | 0.999 | 2.5 | 100 | 102.5 | 20 |
| | 2330 | 29 | 32 | 32 | 1.000 | 0.999 | 2.5 | 100 | 102.5 | 66 |
| 22 Aug | 36 | 57 | 37 | 44 | 0.841 | 0.999 | 2.5 | 100 | 102.5 | 39 |
| | 201 | 30 | 33 | 53 | 0.623 | 0.999 | 2.5 | 100 | 102.5 | 66 |
| | 601 | 31 | 24 | 60 | 0.400 | 0.999 | 2.5 | 100 | 102.5 | 46 |
| | 814 | 30 | 20 | 17 | 1.176 | 0.999 | 2.5 | 100 | 102.5 | 40 |
| | 1215 | 10 | 3 | 3 | 1.000 | 0.999 | 2.5 | 100 | 102.5 | 18 |
| | 1648 | 10 | 0 | 0 | -- | 0.999 | 2.5 | 100 | 102.5 | 0 |
| | 2239 | 20 | 7 | 10 | 0.700 | 0.999 | 2.5 | 100 | 102.5 | 21 |
| | 2330 | 25 | 18 | 19 | 0.947 | 0.999 | 2.5 | 100 | 102.5 | 43 |
| 23 Aug | 49 | 10 | 27 | 35 | 0.771 | 0.999 | 2.5 | 100 | 102.5 | 162 |
| | 202 | 30 | 12 | 10 | 1.200 | 0.999 | 2.5 | 100 | 102.5 | 24 |
| | 624 | 30 | 15 | 17 | 0.882 | 0.999 | 2.5 | 100 | 102.5 | 30 |
| | 815 | 15 | 5 | 6 | 0.833 | 0.999 | 2.5 | 100 | 102.5 | 20 |
| | 2201 | 30 | 35 | 44 | 0.795 | 0.999 | 2.5 | 100 | 102.5 | 70 |
| | 2340 | 20 | 22 | 24 | 0.917 | 0.999 | 2.5 | 100 | 102.5 | 66 |
| 24 Aug | 104 | 20 | 16 | 22 | 0.727 | 0.999 | 2.5 | 100 | 102.5 | 48 |
| | 201 | 30 | 38 | 38 | 1.000 | 0.999 | 2.5 | 100 | 102.5 | 76 |
| | 605 | 30 | 12 | 52 | 0.231 | 0.999 | 2.5 | 100 | 102.5 | 24 |
| | 805 | 20 | 10 | 20 | 0.500 | 0.999 | 2.5 | 100 | 102.5 | 30 |
| | 1202 | 15 | 7 | 4 | 1.750 | 0.999 | 2.5 | 100 | 102.5 | 28 |
| | 1640 | 15 | 3 | 5 | 0.600 | 0.999 | 2.5 | 100 | 102.5 | 12 |
| | 2101 | 15 | 16 | 18 | 0.889 | 0.999 | 2.5 | 100 | 102.5 | 64 |
| | 2233 | 25 | 46 | 55 | 0.836 | 0.999 | 2.5 | 100 | 102.5 | 110 |
| | 2330 | 30 | 16 | 28 | 0.571 | 0.999 | 2.5 | 100 | 102.5 | 32 |
| 25 Aug | 30 | 30 | 19 | 21 | 0.905 | 0.999 | 2.5 | 100 | 102.5 | 38 |
| | 144 | 15 | 28 | 45 | 0.622 | 0.999 | 2.5 | 100 | 102.5 | 112 |
| | 201 | 15 | 10 | 9 | 1.111 | 0.999 | 2.5 | 100 | 102.5 | 40 |
| | 616 | 30 | 15 | 37 | 0.405 | 0.999 | 2.5 | 100 | 102.5 | 30 |
| | 803 | 10 | 8 | 13 | 0.615 | 0.999 | 2.5 | 100 | 102.5 | 48 |
| | 1935 | 15 | 10 | 7 | 1.429 | 0.999 | 2.5 | 100 | 102.5 | 40 |
| | 2144 | 15 | 11 | 15 | 0.733 | 0.999 | 2.5 | 100 | 102.5 | 44 |
| | 2229 | 30 | 19 | 31 | 0.613 | 0.999 | 2.5 | 100 | 102.5 | 38 |
| | 2340 | 20 | 23 | 23 | 1.000 | 0.999 | 2.5 | 100 | 102.5 | 69 |
| 26 Aug | 100 | 30 | 39 | 57 | 0.684 | 0.999 | 2.5 | 100 | 102.5 | 78 |
| | 200 | 30 | 45 | 81 | 0.556 | 0.999 | 2.5 | 100 | 102.5 | 90 |
| | 610 | 30 | 24 | 53 | 0.453 | 0.999 | 2.5 | 100 | 102.5 | 48 |
| | 811 | 30 | 23 | 47 | 0.489 | 0.999 | 2.5 | 100 | 102.5 | 46 |
| | 1211 | 30 | 23 | 22 | 1.045 | 0.999 | 2.5 | 100 | 102.5 | 46 |
| | 1702 | 20 | 16 | 25 | 0.640 | 0.999 | 2.5 | 100 | 102.5 | 48 |
| | 2005 | 25 | 29 | 40 | 0.725 | 0.999 | 2.5 | 100 | 102.5 | 70 |
| | 2203 | 27 | 40 | 61 | 0.656 | 0.999 | 2.5 | 100 | 102.5 | 89 |
| 27 Aug | 20 | 20 | 20 | 40 | 0.500 | 0.999 | 2.5 | 100 | 102.5 | 60 |
| | 200 | 30 | 34 | 56 | 0.607 | 0.999 | 2.5 | 100 | 102.5 | 68 |
| | 610 | 30 | 34 | 45 | 0.756 | 0.999 | 2.5 | 90 | 92.5 | 68 |
| | 805 | 25 | 16 | 26 | 0.615 | 0.999 | 2.5 | 90 | 92.5 | 38 |
| | 1211 | 20 | 16 | 20 | 0.800 | 0.999 | 2.5 | 90 | 92.5 | 48 |
| | 1605 | 25 | 16 | 25 | 0.640 | 0.999 | 2.5 | 90 | 92.5 | 38 |
| | 2029 | 30 | 16 | 22 | 0.727 | 0.999 | 2.5 | 90 | 92.5 | 32 |
| | 2210 | 30 | 37 | 51 | 0.725 | 0.999 | 2.5 | 90 | 92.5 | 74 |
| | 2322 | 30 | 35 | 37 | 0.946 | 0.999 | 2.5 | 90 | 92.5 | 70 |
| 28 Aug | 101 | 15 | 22 | 23 | 0.957 | 0.999 | 2.5 | 90 | 92.5 | 88 |
| | 200 | 30 | 31 | 29 | 1.069 | 0.999 | 2.5 | 90 | 92.5 | 62 |
| | 809 | 30 | 20 | 21 | 0.952 | 0.999 | 2.5 | 90 | 92.5 | 40 |
| | 1200 | 30 | 16 | 15 | 1.067 | 0.999 | 2.5 | 90 | 92.5 | 32 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2107 | 30 | 17 | 27 | 0.630 | 0.999 | 2.5 | 90 | 92.5 | 34 |
| | 2333 | 27 | 26 | 31 | 0.839 | 0.999 | 2.5 | 90 | 92.5 | 58 |
| 29 Aug | 100 | 15 | 17 | 19 | 0.895 | 0.999 | 2.5 | 90 | 92.5 | 68 |
| | 200 | 30 | 33 | 39 | 0.846 | 0.999 | 2.5 | 90 | 92.5 | 66 |
| | 615 | 30 | 12 | 14 | 0.857 | 0.999 | 2.5 | 90 | 92.5 | 24 |
| | 808 | 30 | 4 | 10 | 0.400 | 0.999 | 2.5 | 90 | 92.5 | 8 |
| | 1150 | 15 | 3 | 3 | 1.000 | 0.999 | 2.5 | 90 | 92.5 | 12 |
| 30 Aug | 29 * | 30 | 26 | 33 | 0.788 | 0.600 | 1.0 | 150 | 151.0 | 52 |
| | 102 * | 47 | 41 | 39 | 1.051 | 0.761 | 1.0 | 150 | 151.0 | 52 |
| | 626 * | 30 | 14 | 37 | 0.378 | 0.761 | 1.0 | 150 | 151.0 | 28 |
| | 831 * | 20 | 9 | 45 | 0.200 | 0.761 | 1.0 | 150 | 151.0 | 27 |
| | 2312 * | 33 | 23 | 16 | 1.438 | 0.550 | 2.0 | 129 | 131.0 | 42 |
| 31 Aug | 10 * | 20 | 10 | 11 | 0.909 | 0.550 | 2.0 | 129 | 131.0 | 30 |
| | 234 * | 26 | 45 | 50 | 0.900 | 0.700 | 2.0 | 129 | 131.0 | 104 |
| | 1030 * | 15 | 9 | 11 | 0.818 | 0.700 | 2.0 | 129 | 131.0 | 36 |
| | 1705 * | 15 | 7 | 9 | 0.778 | 0.700 | 2.0 | 129 | 131.0 | 28 |
| | 2210 * | 10 | 38 | 56 | 0.679 | 0.900 | 1.0 | 145 | 146.0 | 228 |
| | 2230 * | 20 | 51 | 45 | 1.133 | 0.999 | 1.0 | 145 | 146.0 | 153 |
| | 2303 * | 15 | 31 | 27 | 1.148 | 0.999 | 1.0 | 145 | 146.0 | 124 |
| | 1 | 21 | 66 | 96 | 0.688 | 0.999 | 2.0 | 100 | 102.0 | 189 |
| | 29 | 19 | 28 | 31 | 0.903 | 0.999 | 2.0 | 100 | 102.0 | 88 |
| | 125 | 30 | 44 | 52 | 0.846 | 0.999 | 2.0 | 100 | 102.0 | 88 |
| | 234 | 26 | 36 | 46 | 0.783 | 0.999 | 1.0 | 101 | 102.0 | 83 |
| | 307 | 20 | 39 | 42 | 0.929 | 0.999 | 1.0 | 101 | 102.0 | 117 |
| | 714 | 30 | 31 | 76 | 0.408 | 0.999 | 1.0 | 101 | 102.0 | 62 |
| | 840 | 20 | 12 | 17 | 0.706 | 0.999 | 1.0 | 101 | 102.0 | 36 |
| | 1030 | 15 | 10 | 12 | 0.833 | 0.999 | 1.0 | 101 | 102.0 | 40 |
| | 1708 | 18 | 14 | 17 | 0.824 | 0.999 | 1.0 | 101 | 102.0 | 47 |
| 01 Sep | 50 * | 32 | 53 | 86 | 0.616 | 0.999 | 1.0 | 145 | 146.0 | 99 |
| | 135 * | 24 | 34 | 31 | 1.097 | 0.900 | 1.0 | 145 | 146.0 | 85 |
| | 202 * | 17 | 22 | 29 | 0.759 | 0.821 | 1.0 | 145 | 146.0 | 78 |
| | 715 * | 25 | 21 | 80 | 0.263 | 0.821 | 1.0 | 145 | 146.0 | 50 |
| | 745 * | 15 | 14 | 21 | 0.667 | 0.821 | 1.0 | 145 | 146.0 | 56 |
| | 1004 * | 20 | 26 | 49 | 0.531 | 0.821 | 1.0 | 145 | 146.0 | 78 |
| | 1220 * | 13 | 8 | 11 | 0.727 | 0.821 | 1.0 | 145 | 146.0 | 37 |
| | 1654 * | 25 | 21 | 23 | 0.913 | 0.821 | 1.0 | 145 | 146.0 | 50 |
| | 2218 * | 25 | 41 | 64 | 0.641 | 0.821 | 1.0 | 145 | 146.0 | 98 |
| | 2248 * | 11 | 18 | 38 | 0.474 | 0.999 | 1.0 | 145 | 146.0 | 98 |
| | 2339 * | 20 | 49 | 51 | 0.961 | 0.850 | 1.0 | 145 | 146.0 | 147 |
| 02 Sep | 211 * | 11 | 23 | 29 | 0.793 | 0.850 | 1.0 | 145 | 146.0 | 125 |
| | 227 * | 20 | 19 | 17 | 1.118 | 0.850 | 1.0 | 145 | 146.0 | 57 |
| | 617 * | 20 | 30 | 64 | 0.469 | 0.850 | 1.0 | 145 | 146.0 | 90 |
| | 2254 * | 13 | 10 | 12 | 0.833 | 0.850 | 1.0 | 145 | 146.0 | 46 |
| | 2330 * | 30 | 34 | 30 | 1.133 | 0.850 | 1.0 | 145 | 146.0 | 68 |
| 03 Sep | 105 * | 15 | 21 | 18 | 1.167 | 0.850 | 1.0 | 145 | 146.0 | 84 |
| | 200 * | 30 | 69 | 70 | 0.986 | 0.850 | 1.0 | 145 | 146.0 | 138 |
| | 624 * | 30 | 74 | 100 | 0.740 | 0.850 | 1.0 | 145 | 146.0 | 148 |
| | 921 * | 20 | 47 | 43 | 1.093 | 0.850 | 1.0 | 145 | 146.0 | 141 |
| | 1309 * | 16 | 18 | 18 | 1.000 | 0.850 | 1.0 | 145 | 146.0 | 68 |
| | 1717 * | 10 | 5 | 4 | 1.250 | 0.850 | 1.0 | 145 | 146.0 | 30 |
| | 2139 * | 20 | 14 | 14 | 1.000 | 0.850 | 1.0 | 145 | 146.0 | 42 |
| | 2225 * | 20 | 17 | 17 | 1.000 | 0.850 | 1.0 | 145 | 146.0 | 51 |
| 04 Sep | 7 * | 15 | 17 | 15 | 1.133 | 0.850 | 1.0 | 145 | 146.0 | 68 |
| | 100 * | 15 | 44 | 41 | 1.073 | 0.850 | 1.0 | 145 | 146.0 | 176 |
| | 200 * | 20 | 31 | 28 | 1.107 | 0.850 | 1.0 | 145 | 146.0 | 93 |
| | 620 * | 20 | 37 | 41 | 0.902 | 0.850 | 1.0 | 145 | 146.0 | 111 |
| | 757 * | 25 | 54 | 59 | 0.915 | 0.850 | 1.0 | 145 | 146.0 | 130 |
| | 1220 * | 15 | 14 | 12 | 1.167 | 0.850 | 1.0 | 145 | 146.0 | 56 |
| | 1601 * | 15 | 17 | 14 | 1.214 | 0.850 | 1.0 | 145 | 146.0 | 68 |
| | 2135 * | 20 | 25 | 25 | 1.000 | 0.850 | 1.0 | 145 | 146.0 | 75 |
| | 2201 * | 15 | 12 | 14 | 0.857 | 0.850 | 1.0 | 145 | 146.0 | 48 |
| | 2330 * | 30 | 23 | 29 | 0.793 | 0.850 | 1.0 | 145 | 146.0 | 46 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 05 Sep | 100 * | 15 | 13 | 12 | 1.083 | 0.850 | 1.0 | 145 | 146.0 | 52 |
| | 200 * | 30 | 29 | 22 | 1.318 | 0.850 | 1.0 | 145 | 146.0 | 58 |
| | 636 * | 24 | 22 | 24 | 0.917 | 0.850 | 1.0 | 145 | 146.0 | 55 |
| | 800 * | 30 | 27 | 31 | 0.871 | 0.850 | 1.0 | 145 | 146.0 | 54 |
| | 1202 * | 15 | 6 | 5 | 1.200 | 0.850 | 1.0 | 145 | 146.0 | 24 |
| | 1608 * | 20 | 6 | 4 | 1.500 | 0.850 | 1.0 | 145 | 146.0 | 18 |
| | 2057 * | 30 | 42 | 35 | 1.200 | 0.850 | 1.0 | 145 | 146.0 | 84 |
| | 2143 * | 15 | 23 | 31 | 0.742 | 0.850 | 1.0 | 145 | 146.0 | 92 |
| | 2202 * | 20 | 28 | 33 | 0.848 | 0.800 | 1.0 | 145 | 146.0 | 84 |
| | 2335 * | 25 | 38 | 32 | 1.188 | 0.800 | 1.0 | 145 | 146.0 | 91 |
| 06 Sep | 2 * | 15 | 13 | 13 | 1.000 | 0.741 | 1.0 | 145 | 146.0 | 52 |
| | 100 * | 15 | 25 | 28 | 0.893 | 0.741 | 1.0 | 145 | 146.0 | 100 |
| | 200 * | 15 | 26 | 33 | 0.788 | 0.741 | 1.0 | 145 | 146.0 | 104 |
| | 226 * | 15 | 14 | 13 | 1.077 | 0.790 | 1.0 | 145 | 146.0 | 56 |
| | 633 * | 15 | 14 | 15 | 0.933 | 0.790 | 1.0 | 145 | 146.0 | 56 |
| | 655 * | 15 | 7 | 10 | 0.700 | 0.790 | 1.0 | 145 | 146.0 | 28 |
| | 812 * | 20 | 14 | 13 | 1.077 | 0.790 | 1.0 | 145 | 146.0 | 42 |
| | 1205 * | 15 | 4 | 3 | 1.333 | 0.790 | 1.0 | 145 | 146.0 | 16 |
| | 1553 * | 15 | 2 | 2 | 1.000 | 0.790 | 1.0 | 145 | 146.0 | 8 |
| | 2039 * | 20 | 16 | 13 | 1.231 | 0.790 | 1.0 | 145 | 146.0 | 48 |
| | 2214 * | 25 | 38 | 34 | 1.118 | 0.790 | 1.0 | 145 | 146.0 | 91 |
| | 2329 * | 30 | 44 | 38 | 1.158 | 0.790 | 1.0 | 145 | 146.0 | 88 |
| 07 Sep | 103 * | 15 | 21 | 24 | 0.875 | 0.790 | 1.0 | 145 | 146.0 | 84 |
| | 200 * | 30 | 45 | 46 | 0.978 | 0.790 | 1.0 | 145 | 146.0 | 90 |
| | 640 * | 18 | 24 | 38 | 0.632 | 0.790 | 1.0 | 145 | 146.0 | 80 |
| | 732 * | 15 | 16 | 17 | 0.941 | 0.790 | 1.0 | 145 | 146.0 | 64 |
| | 914 * | 15 | 23 | 24 | 0.958 | 0.790 | 1.0 | 145 | 146.0 | 92 |
| | 1300 * | 15 | 7 | 11 | 0.636 | 0.790 | 1.0 | 145 | 146.0 | 28 |
| 08 Sep | none | | | | | | | | | |
| 09 Sep | 1 * | 15 | 25 | 20 | 1.250 | 0.790 | 1.0 | 150 | 151.0 | 100 |
| | 20 * | 15 | 30 | 32 | 0.938 | 0.750 | 1.0 | 150 | 151.0 | 120 |
| | 125 * | 15 | 18 | 12 | 1.500 | 0.750 | 1.0 | 150 | 151.0 | 72 |
| | 637 * | 20 | 30 | 32 | 0.938 | 0.750 | 1.0 | 150 | 151.0 | 90 |
| | 725 * | 20 | 24 | 29 | 0.828 | 0.750 | 1.0 | 150 | 151.0 | 72 |
| | 1038 * | 15 | 10 | 7 | 1.429 | 0.750 | 1.0 | 150 | 151.0 | 40 |
| | 1830 * | 15 | 10 | 14 | 0.714 | 0.750 | 1.0 | 150 | 151.0 | 40 |
| | 2118 * | 30 | 25 | 22 | 1.136 | 0.700 | 1.0 | 150 | 151.0 | 50 |
| | 2222 * | 20 | 19 | 20 | 0.950 | 0.700 | 1.0 | 150 | 151.0 | 57 |
| | 2330 * | 30 | 20 | 16 | 1.250 | 0.700 | 1.0 | 150 | 151.0 | 40 |
| 10 Sep | 100 * | 15 | 10 | 7 | 1.429 | 0.700 | 1.0 | 150 | 151.0 | 40 |
| | 220 * | 30 | 18 | 17 | 1.059 | 0.700 | 1.0 | 150 | 151.0 | 36 |
| | 653 * | 20 | 10 | 4 | 2.500 | 0.700 | 1.0 | 150 | 151.0 | 30 |
| | 900 * | 15 | 4 | 2 | 2.000 | 0.700 | 1.0 | 150 | 151.0 | 16 |
| | 2018 * | 25 | 12 | 11 | 1.091 | 0.550 | 1.0 | 145 | 146.0 | 29 |
| | 2146 * | 20 | 27 | 25 | 1.080 | 0.550 | 1.0 | 145 | 146.0 | 81 |
| | 2210 * | 20 | 16 | 12 | 1.333 | 0.550 | 1.0 | 145 | 146.0 | 48 |
| | 2330 * | 30 | 32 | 31 | 1.032 | 0.550 | 1.0 | 145 | 146.0 | 64 |
| 11 Sep | 100 * | 15 | 13 | 16 | 0.813 | 0.550 | 1.0 | 145 | 146.0 | 52 |
| | 200 * | 30 | 22 | 20 | 1.100 | 0.550 | 1.0 | 145 | 146.0 | 44 |
| | 637 * | 20 | 5 | 1 | 5.000 | 0.550 | 1.0 | 145 | 146.0 | 15 |
| | 802 * | 25 | 2 | 2 | 1.000 | 0.550 | 1.0 | 145 | 146.0 | 5 |
| | 1630 * | 15 | 1 | 1 | 1.000 | 0.550 | 1.0 | 145 | 146.0 | 4 |
| | 2127 * | 30 | 0 | 0 | -- | 0.550 | 1.0 | 145 | 146.0 | 0 |
| | 2205 * | 20 | 1 | 1 | 1.000 | 0.550 | 1.0 | 145 | 146.0 | 3 |
| | 2330 * | 30 | 0 | 0 | -- | 0.550 | 1.0 | 145 | 146.0 | 0 |
| 12 Sep | 105 * | 15 | 0 | 0 | -- | 0.550 | 1.0 | 145 | 146.0 | 0 |
| | 200 * | 20 | 0 | 0 | -- | 0.550 | 1.0 | 145 | 146.0 | 0 |
| | 527 * | 30 | 3 | 3 | 1.000 | 0.550 | 1.0 | 145 | 146.0 | 6 |
| | 627 * | 30 | 0 | 1 | 0.000 | 0.550 | 1.0 | 145 | 146.0 | 0 |
| | 707 * | 20 | 0 | 0 | -- | 0.550 | 1.0 | 145 | 146.0 | 0 |
| | 2034 * | 20 | 5 | 8 | 0.625 | 0.900 | 2.5 | 135 | 137.5 | 15 |
| | 2133 * | 20 | 11 | 14 | 0.786 | 0.900 | 2.5 | 135 | 137.5 | 33 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2203 * | 20 | 22 | 29 | 0.759 | 0.900 | 2.5 | 135 | 137.5 | 66 |
| | 2330 * | 30 | 19 | 20 | 0.950 | 0.900 | 2.5 | 135 | 137.5 | 38 |
| 13 Sep | 130 * | 15 | 12 | 12 | 1.000 | 0.900 | 2.5 | 135 | 137.5 | 48 |
| | 220 * | 30 | 40 | 35 | 1.143 | 0.900 | 2.5 | 135 | 137.5 | 80 |
| | 540 * | 20 | 7 | 7 | 1.000 | 0.900 | 2.5 | 135 | 137.5 | 21 |
| | 640 * | 20 | 1 | 1 | 1.000 | 0.900 | 2.5 | 135 | 137.5 | 3 |
| | 705 * | 15 | 2 | 3 | 0.667 | 0.900 | 2.5 | 135 | 137.5 | 8 |
| | 1915 * | 15 | 3 | 2 | 1.500 | 0.900 | 2.5 | 135 | 137.5 | 12 |
| | 2030 * | 15 | 4 | 3 | 1.333 | 0.900 | 2.5 | 135 | 137.5 | 16 |
| | 2138 * | 20 | 25 | 24 | 1.042 | 0.830 | 2.5 | 135 | 137.5 | 75 |
| | 2203 * | 20 | 21 | 18 | 1.167 | 0.830 | 2.5 | 135 | 137.5 | 63 |
| | 2330 * | 30 | 16 | 12 | 1.333 | 0.830 | 2.5 | 135 | 137.5 | 32 |
| 14 Sep | 100 * | 15 | 16 | 16 | 1.000 | 0.830 | 2.5 | 135 | 137.5 | 64 |
| | 200 * | 30 | 44 | 33 | 1.333 | 0.830 | 2.5 | 135 | 137.5 | 88 |
| | 231 * | 10 | 13 | 14 | 0.929 | 0.622 | 2.5 | 135 | 137.5 | 78 |
| | 536 * | 20 | 6 | 4 | 1.500 | 0.622 | 2.5 | 135 | 137.5 | 18 |
| | 633 * | 25 | 6 | 6 | 1.000 | 0.622 | 2.5 | 135 | 137.5 | 14 |
| | 735 * | 25 | 8 | 6 | 1.333 | 0.622 | 2.5 | 135 | 137.5 | 19 |
| | 2010 * | 15 | 2 | 2 | 1.000 | 0.622 | 2.5 | 135 | 137.5 | 8 |
| | 2117 * | 21 | 26 | 23 | 1.130 | 0.622 | 2.5 | 135 | 137.5 | 74 |
| | 2220 * | 15 | 8 | 6 | 1.333 | 0.622 | 2.5 | 135 | 137.5 | 32 |
| | 2330 * | 30 | 34 | 40 | 0.850 | 0.622 | 2.5 | 135 | 137.5 | 68 |
| 15 Sep | 100 * | 15 | 17 | 12 | 1.417 | 0.622 | 2.5 | 135 | 137.5 | 68 |
| | 200 * | 30 | 34 | 36 | 0.944 | 0.622 | 2.5 | 135 | 137.5 | 68 |
| | 530 * | 30 | 17 | 16 | 1.063 | 0.622 | 2.5 | 135 | 137.5 | 34 |
| | 651 * | 20 | 7 | 10 | 0.700 | 0.622 | 2.5 | 135 | 137.5 | 21 |
| | 755 * | 15 | 3 | 5 | 0.600 | 0.622 | 2.5 | 135 | 137.5 | 12 |
| | 1200 * | 10 | 1 | 0 | -- | 0.622 | 2.5 | 135 | 137.5 | 6 |
| | 1630 * | 10 | 0 | 0 | -- | 0.622 | 1.0 | 130 | 131.0 | 0 |
| | 2040 * | 15 | 0 | 0 | -- | 0.622 | 1.0 | 130 | 131.0 | 0 |
| | 2118 * | 15 | 0 | 0 | -- | 0.622 | 1.0 | 130 | 131.0 | 0 |
| | 2250 * | 10 | 17 | 20 | 0.850 | 0.622 | 1.0 | 130 | 131.0 | 102 |
| | 2330 * | 30 | 66 | 90 | 0.733 | 0.622 | 1.0 | 130 | 131.0 | 132 |
| 16 Sep | 5 * | 15 | 19 | 24 | 0.792 | 0.848 | 1.0 | 130 | 131.0 | 76 |
| | 100 * | 15 | 15 | 16 | 0.938 | 0.848 | 1.0 | 130 | 131.0 | 60 |
| | 200 * | 30 | 32 | 36 | 0.889 | 0.848 | 1.0 | 130 | 131.0 | 64 |
| | 610 * | 25 | 26 | 30 | 0.867 | 0.848 | 1.0 | 130 | 131.0 | 62 |
| | 710 * | 25 | 16 | 18 | 0.889 | 0.848 | 1.0 | 130 | 131.0 | 38 |
| | 810 * | 15 | 11 | 15 | 0.733 | 0.848 | 1.0 | 130 | 131.0 | 44 |
| | 1200 * | 15 | 1 | 0 | -- | 0.848 | 1.0 | 130 | 131.0 | 4 |
| | 2006 * | 30 | 71 | 74 | 0.959 | 0.848 | 1.0 | 130 | 131.0 | 142 |
| | 2110 * | 25 | 26 | 24 | 1.083 | 0.848 | 1.0 | 130 | 131.0 | 62 |
| | 2225 * | 15 | 21 | 21 | 1.000 | 0.848 | 1.0 | 130 | 131.0 | 84 |
| | 2330 * | 30 | 57 | 51 | 1.118 | 0.848 | 1.0 | 130 | 131.0 | 114 |
| 17 Sep | 104 * | 15 | 39 | 42 | 0.929 | 0.848 | 1.0 | 130 | 131.0 | 156 |
| | 200 * | 30 | 88 | 87 | 1.011 | 0.848 | 1.0 | 130 | 131.0 | 176 |
| | 530 * | 25 | 40 | 36 | 1.111 | 0.848 | 1.0 | 130 | 131.0 | 96 |
| | 630 * | 20 | 31 | 37 | 0.838 | 0.848 | 1.0 | 130 | 131.0 | 93 |
| | 730 * | 20 | 29 | 27 | 1.074 | 0.848 | 1.0 | 130 | 131.0 | 87 |
| | 830 * | 15 | 1 | 2 | 0.500 | 0.848 | 1.0 | 130 | 131.0 | 4 |
| | 2051 * | 15 | 23 | 17 | 1.353 | 0.848 | 1.0 | 130 | 131.0 | 92 |
| | 2115 * | 20 | 50 | 54 | 0.926 | 0.748 | 1.0 | 130 | 131.0 | 150 |
| | 2218 * | 15 | 26 | 35 | 0.743 | 0.748 | 1.0 | 130 | 131.0 | 104 |
| | 2236 * | 10 | 18 | 17 | 1.059 | 0.800 | 1.0 | 130 | 131.0 | 108 |
| | 2330 * | 30 | 56 | 57 | 0.982 | 0.800 | 1.0 | 130 | 131.0 | 112 |
| 18 Sep | 30 * | 10 | 17 | 18 | 0.944 | 0.800 | 1.0 | 130 | 131.0 | 102 |
| | 105 * | 15 | 29 | 31 | 0.935 | 0.800 | 1.0 | 130 | 131.0 | 116 |
| | 200 * | 30 | 71 | 82 | 0.866 | 0.800 | 1.0 | 130 | 131.0 | 142 |
| | 605 * | 20 | 39 | 34 | 1.147 | 0.800 | 1.0 | 130 | 131.0 | 117 |
| | 705 * | 20 | 12 | 11 | 1.091 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 805 * | 20 | 14 | 13 | 1.077 | 0.800 | 1.0 | 130 | 131.0 | 42 |
| | 1152 * | 15 | 5 | 4 | 1.250 | 0.800 | 1.0 | 130 | 131.0 | 20 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1355 * | 15 | 6 | 8 | 0.750 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 2015 * | 15 | 16 | 15 | 1.067 | 0.800 | 1.0 | 130 | 131.0 | 64 |
| | 2100 * | 15 | 14 | 12 | 1.167 | 0.800 | 1.0 | 130 | 131.0 | 56 |
| | 2145 * | 15 | 19 | 22 | 0.864 | 0.800 | 1.0 | 130 | 131.0 | 76 |
| | 2235 * | 15 | 9 | 9 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| 19 Sep | 14 * | 30 | 31 | 27 | 1.148 | 0.800 | 1.0 | 130 | 131.0 | 62 |
| | 115 * | 15 | 24 | 24 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 96 |
| | 200 * | 30 | 56 | 57 | 0.982 | 0.800 | 1.0 | 130 | 131.0 | 112 |
| | 530 * | 20 | 19 | 19 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 57 |
| | 630 * | 20 | 16 | 15 | 1.067 | 0.800 | 1.0 | 130 | 131.0 | 48 |
| | 730 * | 20 | 14 | 22 | 0.636 | 0.800 | 1.0 | 130 | 131.0 | 42 |
| | 1214 * | 15 | -- | -- | -- | 0.800 | 1.0 | 130 | 131.0 | -- |
| | 1610 * | 15 | 11 | 12 | 0.917 | 0.800 | 1.0 | 130 | 131.0 | 44 |
| | 2010 * | 15 | 7 | 9 | 0.778 | 0.800 | 1.0 | 130 | 131.0 | 28 |
| | 2100 * | 15 | 17 | 22 | 0.773 | 0.800 | 1.0 | 130 | 131.0 | 68 |
| | 2140 * | 15 | 13 | 11 | 1.182 | 0.800 | 1.0 | 130 | 131.0 | 52 |
| | 2219 * | 15 | 18 | 23 | 0.783 | 0.800 | 1.0 | 130 | 131.0 | 72 |
| | 2340 * | 20 | 12 | 8 | 1.500 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| 20 Sep | 30 * | 15 | 14 | 12 | 1.167 | 0.800 | 1.0 | 130 | 131.0 | 56 |
| | 115 * | 15 | 11 | 12 | 0.917 | 0.800 | 1.0 | 130 | 131.0 | 44 |
| | 235 * | 25 | 22 | 20 | 1.100 | 0.800 | 1.0 | 130 | 131.0 | 53 |
| | 530 * | 20 | 10 | 9 | 1.111 | 0.800 | 1.0 | 130 | 131.0 | 30 |
| | 630 * | 20 | 8 | 13 | 0.615 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 730 * | 15 | 6 | 6 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 844 * | 15 | 4 | 6 | 0.667 | 0.800 | 1.0 | 130 | 131.0 | 16 |
| | 2047 * | 15 | 11 | 16 | 0.688 | 0.700 | 1.0 | 130 | 131.0 | 44 |
| | 2149 * | 10 | 14 | 20 | 0.700 | 0.700 | 1.0 | 130 | 131.0 | 84 |
| | 2210 * | 15 | 14 | 28 | 0.500 | 0.700 | 1.0 | 130 | 131.0 | 56 |
| | 2245 * | 15 | 13 | 15 | 0.867 | 0.600 | 1.0 | 130 | 131.0 | 52 |
| | 2330 * | 30 | 21 | 28 | 0.750 | 0.600 | 1.0 | 130 | 131.0 | 42 |
| 21 Sep | 32 * | 15 | 22 | 33 | 0.667 | 0.600 | 1.0 | 130 | 131.0 | 88 |
| | 55 * | 10 | 10 | 9 | 1.111 | 0.800 | 1.0 | 130 | 131.0 | 60 |
| | 206 * | 30 | 32 | 28 | 1.143 | 0.800 | 1.0 | 130 | 131.0 | 64 |
| | 530 * | 20 | 21 | 58 | 0.362 | 0.800 | 1.0 | 130 | 131.0 | 63 |
| | 630 * | 15 | 10 | 17 | 0.588 | 0.800 | 1.0 | 130 | 131.0 | 40 |
| | 730 * | 20 | 14 | 18 | 0.778 | 0.800 | 1.0 | 130 | 131.0 | 42 |
| | 840 * | 15 | 8 | 16 | 0.500 | 0.800 | 1.0 | 130 | 131.0 | 32 |
| | 2030 * | 20 | 11 | 17 | 0.647 | 0.800 | 1.0 | 130 | 131.0 | 33 |
| | 2145 * | 15 | 7 | 7 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 28 |
| | 2233 * | 15 | 6 | 6 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 2340 * | 20 | 11 | 23 | 0.478 | 0.800 | 1.0 | 130 | 131.0 | 33 |
| 22 Sep | 103 * | 15 | 13 | 11 | 1.182 | 0.800 | 1.0 | 130 | 131.0 | 52 |
| | 200 * | 30 | 18 | 21 | 0.857 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 530 * | 20 | 10 | 11 | 0.909 | 0.800 | 1.0 | 130 | 131.0 | 30 |
| | 630 * | 15 | 3 | 6 | 0.500 | 0.800 | 1.0 | 130 | 131.0 | 12 |
| | 730 * | 15 | 9 | 9 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 1230 * | 15 | 2 | 1 | 2.000 | 0.800 | 1.0 | 130 | 131.0 | 8 |
| | 2000 * | 20 | 10 | 12 | 0.833 | 0.800 | 1.0 | 130 | 131.0 | 30 |
| | 2100 * | 20 | 16 | 19 | 0.842 | 0.800 | 1.0 | 130 | 131.0 | 48 |
| | 2150 * | 20 | 11 | 9 | 1.222 | 0.800 | 1.0 | 130 | 131.0 | 33 |
| | 2330 * | 30 | 11 | 10 | 1.100 | 0.800 | 1.0 | 130 | 131.0 | 22 |
| 23 Sep | 29 * | 15 | 3 | 3 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 12 |
| | 108 * | 15 | 9 | 8 | 1.125 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 200 * | 30 | 12 | 15 | 0.800 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 530 * | 20 | 12 | 11 | 1.091 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 630 * | 20 | 9 | 10 | 0.900 | 0.800 | 1.0 | 130 | 131.0 | 27 |
| | 730 * | 20 | 7 | 5 | 1.400 | 0.800 | 1.0 | 130 | 131.0 | 21 |
| | 845 * | 15 | 2 | 3 | 0.667 | 0.800 | 1.0 | 130 | 131.0 | 8 |
| | 1222 * | 15 | 4 | 8 | 0.500 | 0.800 | 1.0 | 130 | 131.0 | 16 |
| | 1600 * | 15 | 3 | 7 | 0.429 | 0.800 | 1.0 | 130 | 131.0 | 12 |
| | 2045 * | 15 | 3 | 2 | 1.500 | 0.800 | 1.0 | 130 | 131.0 | 12 |
| | 2100 * | 15 | 10 | 12 | 0.833 | 0.800 | 1.0 | 130 | 131.0 | 40 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2145 * | 15 | 13 | 10 | 1.300 | 0.800 | 1.0 | 130 | 131.0 | 52 |
| | 2200 * | 15 | 6 | 6 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 2328 * | 30 | 13 | 10 | 1.300 | 0.800 | 1.0 | 130 | 131.0 | 26 |
| 24 Sep | 45 * | 15 | 5 | 5 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 20 |
| | 110 * | 15 | 8 | 7 | 1.143 | 0.800 | 1.0 | 130 | 131.0 | 32 |
| | 200 * | 30 | 5 | 5 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 10 |
| | 700 * | 20 | 12 | 17 | 0.706 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 800 * | 20 | 12 | 14 | 0.857 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 900 * | 20 | 9 | 9 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 27 |
| | 1200 * | 15 | 3 | 3 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 12 |
| | 2000 * | 20 | 2 | 3 | 0.667 | 0.800 | 1.0 | 130 | 131.0 | 6 |
| | 2130 * | 15 | 2 | 1 | 2.000 | 0.800 | 1.0 | 130 | 131.0 | 8 |
| | 2200 * | 15 | -- | -- | -- | 0.800 | 1.0 | 130 | 131.0 | -- |
| | 2320 * | 30 | 11 | 15 | 0.733 | 0.800 | 1.0 | 130 | 131.0 | 22 |
| 25 Sep | 33 * | 15 | 9 | 13 | 0.692 | 0.800 | 1.0 | 130 | 131.0 | 36 |
| | 116 * | 15 | 5 | 8 | 0.625 | 0.800 | 1.0 | 130 | 131.0 | 20 |
| | 200 * | 15 | 6 | 10 | 0.600 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 530 * | 15 | 4 | 4 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 16 |
| | 630 * | 15 | 2 | 3 | 0.667 | 0.800 | 1.0 | 130 | 131.0 | 8 |
| | 730 * | 15 | 2 | 5 | 0.400 | 0.800 | 1.0 | 130 | 131.0 | 8 |
| | 900 * | 15 | 4 | 8 | 0.500 | 0.800 | 1.0 | 130 | 131.0 | 16 |
| | 1205 * | 15 | -- | -- | -- | 0.800 | 1.0 | 130 | 131.0 | -- |
| | 1730 * | 15 | 6 | 9 | 0.667 | 0.800 | 1.0 | 130 | 131.0 | 24 |
| | 2030 * | 15 | 4 | 12 | 0.333 | 0.800 | 1.0 | 130 | 131.0 | 16 |
| | 2115 * | 15 | 2 | 2 | 1.000 | 0.800 | 1.0 | 130 | 131.0 | 8 |
| | 2200 * | 15 | 5 | 8 | 0.625 | 0.800 | 1.0 | 130 | 131.0 | 20 |
| | 2323 * | 30 | 6 | 7 | 0.857 | 0.800 | 1.0 | 130 | 131.0 | 12 |
| 26 Sep | 30 * | 15 | 6 | 6 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 24 |
| | 115 * | 15 | 11 | 15 | 0.733 | 0.999 | 1.0 | 130 | 131.0 | 44 |
| | 200 * | 30 | 12 | 15 | 0.800 | 0.999 | 1.0 | 130 | 131.0 | 24 |
| | 530 * | 15 | 6 | 8 | 0.750 | 0.999 | 1.0 | 130 | 131.0 | 24 |
| | 630 * | 15 | 5 | 7 | 0.714 | 0.999 | 1.0 | 130 | 131.0 | 20 |
| | 730 * | 15 | 5 | 6 | 0.833 | 0.999 | 1.0 | 130 | 131.0 | 20 |
| | 830 * | 15 | 4 | 4 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 16 |
| | 930 * | 15 | 3 | 2 | 1.500 | 0.999 | 1.0 | 130 | 131.0 | 12 |
| | 1125 * | 10 | -- | -- | -- | 0.999 | 1.0 | 130 | 131.0 | -- |
| | 1623 * | 15 | -- | -- | -- | 0.999 | 1.0 | 130 | 131.0 | -- |
| | 2000 * | 15 | -- | -- | -- | 0.999 | 1.0 | 130 | 131.0 | -- |
| | 2100 * | 15 | 3 | 1 | 3.000 | 0.999 | 1.0 | 130 | 131.0 | 12 |
| | 2200 * | 15 | 2 | 2 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 8 |
| | 2320 * | 30 | 8 | 4 | 2.000 | 0.999 | 1.0 | 130 | 131.0 | 16 |
| 27 Sep | 25 * | 15 | 3 | 3 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 12 |
| | 115 * | 15 | 4 | 5 | 0.800 | 0.999 | 1.0 | 130 | 131.0 | 16 |
| | 200 * | 30 | 5 | 5 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 10 |
| | 530 * | 15 | 3 | 2 | 1.500 | 0.999 | 1.0 | 130 | 131.0 | 12 |
| | 630 * | 15 | 4 | 3 | 1.333 | 0.999 | 1.0 | 130 | 131.0 | 16 |
| | 730 * | 15 | 2 | 1 | 2.000 | 0.999 | 1.0 | 130 | 131.0 | 8 |
| | 830 * | 15 | 5 | 7 | 0.714 | 0.999 | 1.0 | 130 | 131.0 | 20 |
| | 1200 * | 15 | 2 | 2 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 8 |
| | 1624 * | 15 | 2 | 1 | 2.000 | 0.999 | 1.0 | 130 | 131.0 | 8 |
| | 2030 * | 15 | 2 | 2 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 8 |
| | 2130 * | 15 | 3 | 4 | 0.750 | 0.999 | 1.0 | 130 | 131.0 | 12 |
| | 2200 * | 15 | 2 | 2 | 1.000 | 0.999 | 1.0 | 130 | 131.0 | 8 |
| | 2320 * | 30 | 4 | 5 | 0.800 | 0.999 | 1.0 | 130 | 131.0 | 8 |
| Total | 362 | 7,327 | 6,347 | 7,569 | 0.839 | | | | | |

[a] The "adjustment factor" is the oscilloscope count divided by the sonar count, and was used to adjust sonar counts.

[b] Pulse repetition rate of the sonar counter at start of calibration period. When the PRR was changed, that change is reflected in the PRR shown for the start of the next calibration period.

Appendix A.7. Oscilloscope calibrations made to the 1977-model sonar counter at the Sheenjek River project site in 1989.

| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 23 Aug | 2307 | 20 | 56 | 62 | 0.903 | 0.500 | 2.0 | 90.0 | 92.0 | 168 |
| 24 Aug | 101 | 20 | 70 | 67 | 1.045 | 0.500 | 2.0 | 90.0 | 92.0 | 210 |
| | 202 | 21 | 94 | 108 | 0.870 | 0.500 | 2.0 | 90.0 | 92.0 | 269 |
| | 715 | 20 | 139 | 253 | 0.549 | 0.500 | 2.0 | 90.0 | 92.0 | 417 |
| | 746 | 20 | 98 | 101 | 0.970 | 0.900 | 2.0 | 90.0 | 92.0 | 294 |
| | 1250 | 10 | 17 | 8 | -- | 0.500 | 2.0 | 90.0 | 92.0 | 102 |
| | 1400 | 10 | 20 | 8 | 2.500 | 0.500 | 2.0 | 90.0 | 92.0 | 120 |
| | 1708 | 22 | 34 | 45 | 0.756 | 0.500 | 2.0 | 90.0 | 92.0 | 93 |
| | 1733 | 10 | 18 | 20 | 0.900 | 0.660 | 2.0 | 90.0 | 92.0 | 108 |
| | 2031 | 15 | 42 | 73 | 0.575 | 0.660 | 2.0 | 90.0 | 92.0 | 168 |
| | 2110 | 20 | 56 | 54 | 1.037 | 0.750 | 2.0 | 90.0 | 92.0 | 168 |
| | 2233 | 20 | 48 | 58 | 0.828 | 0.650 | 2.0 | 90.0 | 92.0 | 144 |
| | 2303 | 20 | 33 | 26 | 1.269 | 0.700 | 2.0 | 90.0 | 92.0 | 99 |
| 25 Aug | 117 | 20 | 33 | 32 | 1.031 | 0.700 | 2.0 | 90.0 | 92.0 | 99 |
| | 620 | 20 | 34 | 40 | 0.850 | 0.700 | 2.0 | 90.0 | 92.0 | 102 |
| | 722 | 20 | 47 | 47 | 1.000 | 0.700 | 2.0 | 90.0 | 92.0 | 141 |
| | 1038 | 16 | 25 | 22 | 1.136 | 0.700 | 2.0 | 90.0 | 92.0 | 94 |
| | 1337 | 20 | 32 | 32 | 1.000 | 0.700 | 2.0 | 90.0 | 92.0 | 96 |
| | 1930 | 30 | 37 | 32 | 1.156 | 0.700 | 2.0 | 90.0 | 92.0 | 74 |
| | 2015 | 10 | 10 | 12 | 0.833 | 0.700 | 2.0 | 90.0 | 92.0 | 60 |
| | 2114 | 30 | 29 | 30 | 0.967 | 0.700 | 2.0 | 90.0 | 92.0 | 58 |
| | 2220 | 21 | 18 | 16 | 1.125 | 0.700 | 2.0 | 90.0 | 92.0 | 51 |
| | 2301 | 30 | 52 | 68 | 0.765 | 0.700 | 2.0 | 90.0 | 92.0 | 104 |
| | 2335 | 15 | 5 | 2 | 2.500 | 0.900 | 2.0 | 90.0 | 92.0 | 20 |
| 26 Aug | 23 | 31 | 31 | 31 | 1.000 | 0.700 | 2.0 | 90.0 | 92.0 | 60 |
| | 203 | 30 | 42 | 45 | 0.933 | 0.700 | 2.0 | 90.0 | 92.0 | 84 |
| | 515 | 30 | 52 | 61 | 0.852 | 0.700 | 2.0 | 90.0 | 92.0 | 104 |
| | 715 | 30 | 36 | 36 | 1.000 | 0.700 | 2.0 | 90.0 | 92.0 | 72 |
| | 1100 | 30 | 40 | 44 | 0.909 | 0.700 | 2.0 | 90.0 | 92.0 | 80 |
| | 1320 | 15 | 10 | 18 | 0.556 | 0.700 | 3.0 | 90.0 | 93.0 | 40 |
| | 1800 | 10 | 4 | 4 | 1.000 | 0.700 | 3.0 | 90.0 | 93.0 | 24 |
| | 1915 | 15 | 5 | 6 | 0.833 | 0.700 | 3.0 | 90.0 | 93.0 | 20 |
| | 2025 | 30 | 33 | 36 | 0.917 | 0.700 | 3.0 | 90.0 | 93.0 | 66 |
| | 2123 | 21 | 19 | 20 | 0.950 | 0.700 | 3.0 | 90.0 | 93.0 | 54 |
| | 2233 | 25 | 24 | 28 | 0.857 | 0.700 | 3.0 | 90.0 | 93.0 | 58 |
| | 2329 | 20 | 18 | 20 | 0.900 | 0.700 | 3.0 | 90.0 | 93.0 | 54 |
| 27 Aug | 200 | 30 | 67 | 77 | 0.870 | 0.700 | 3.0 | 90.0 | 93.0 | 134 |
| | 515 | 30 | 60 | 79 | 0.759 | 0.700 | 3.0 | 90.0 | 93.0 | 120 |
| | 600 | 10 | 18 | 18 | 1.000 | 0.775 | 3.0 | 90.0 | 93.0 | 108 |
| | 715 | 15 | 10 | 14 | 0.714 | 0.775 | 3.0 | 90.0 | 93.0 | 40 |
| | 1100 | 15 | 4 | 4 | 1.000 | 0.775 | 3.0 | 90.0 | 93.0 | 16 |
| | 1716 | 15 | 7 | 8 | 0.875 | 0.775 | 3.0 | 90.0 | 93.0 | 28 |
| | 1830 | 15 | 1 | 1 | 1.000 | 0.775 | 3.0 | 90.0 | 93.0 | 4 |
| | 1945 | 15 | 4 | 3 | 1.333 | 0.775 | 3.0 | 90.0 | 93.0 | 16 |
| | 2112 | 15 | 2 | 1 | 2.000 | 0.775 | 3.0 | 90.0 | 93.0 | 8 |
| | 2200 | 30 | 35 | 45 | 0.778 | 0.775 | 3.0 | 90.0 | 93.0 | 70 |
| | 2233 | 10 | 17 | 18 | 0.944 | 0.900 | 3.0 | 90.0 | 93.0 | 102 |
| | 2240 | 19 | 25 | 19 | 1.316 | 0.900 | 3.0 | 90.0 | 93.0 | 79 |
| 28 Aug | 1 | 30 | 34 | 45 | 0.756 | 0.700 | 3.0 | 90.0 | 93.0 | 68 |
| | 200 | 31 | 53 | 61 | 0.869 | 0.900 | 3.0 | 90.0 | 93.0 | 103 |
| | 520 | 30 | 32 | 31 | 1.032 | 0.900 | 3.0 | 90.0 | 93.0 | 64 |
| | 615 | 30 | 41 | 30 | 1.367 | 0.900 | 3.0 | 90.0 | 93.0 | 82 |
| | 700 | 15 | 9 | 13 | 0.692 | 0.700 | 3.0 | 90.0 | 93.0 | 36 |
| | 804 | 15 | 9 | 10 | 0.900 | 0.700 | 3.0 | 90.0 | 93.0 | 36 |
| | 1540 | 15 | 0 | 0 | -- | 0.700 | 3.0 | 90.0 | 93.0 | 0 |
| | 1915 | 15 | 4 | 3 | 1.333 | 0.700 | 3.0 | 90.0 | 93.0 | 16 |
| | 2030 | 15 | 5 | 7 | 0.714 | 0.700 | 3.0 | 90.0 | 93.0 | 20 |
| | 2128 | 21 | 14 | 12 | 1.167 | 0.700 | 3.0 | 90.0 | 93.0 | 40 |
| | 2235 | 20 | 19 | 20 | 0.950 | 0.700 | 3.0 | 90.0 | 93.0 | 57 |
| | 2311 | 21 | 18 | 19 | 0.947 | 0.700 | 3.0 | 90.0 | 93.0 | 51 |
| 29 Aug | 11 | 30 | 36 | 40 | 0.900 | 0.700 | 3.0 | 90.0 | 93.0 | 72 |
| | 205 | 20 | 18 | 21 | 0.857 | 0.700 | 3.0 | 90.0 | 93.0 | 54 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 515 | 20 | 14 | 12 | 1.167 | 0.700 | 3.0 | 90.0 | 93.0 | 42 |
| | 615 | 20 | 18 | 22 | 0.818 | 0.700 | 3.0 | 90.0 | 93.0 | 54 |
| | 715 | 15 | 9 | 9 | 1.000 | 0.700 | 3.0 | 90.0 | 93.0 | 36 |
| | 1000 | 15 | 3 | 2 | 1.500 | 0.700 | 3.0 | 90.0 | 93.0 | 12 |
| | 1230 | 15 | 1 | 2 | 0.500 | 0.700 | 3.0 | 90.0 | 93.0 | 4 |
| | 2015 | 15 | 8 | 9 | 0.889 | 0.700 | 3.0 | 90.0 | 93.0 | 32 |
| | 2130 | 15 | 2 | 6 | 0.333 | 0.700 | 3.0 | 90.0 | 93.0 | 8 |
| | 2145 | 15 | 8 | 7 | 1.143 | 0.700 | 3.0 | 90.0 | 93.0 | 32 |
| | 2203 | 15 | 8 | 7 | 1.143 | 0.700 | 3.0 | 90.0 | 93.0 | 32 |
| | 2300 | 20 | 82 | 87 | 0.943 | 0.700 | 3.0 | 90.0 | 93.0 | debris |
| 30 Aug | 30 | 20 | 35 | 45 | 0.778 | 0.700 | 3.0 | 90.0 | 93.0 | 105 |
| | 212 | 20 | 61 | 69 | 0.884 | 0.700 | 3.0 | 90.0 | 93.0 | 183 |
| | 515 | 30 | 27 | 24 | 1.125 | 0.700 | 3.0 | 90.0 | 93.0 | 54 |
| | 615 | 15 | 4 | 4 | 1.000 | 0.700 | 3.0 | 90.0 | 93.0 | 16 |
| | 730 | 20 | 13 | 12 | 1.083 | 0.700 | 3.0 | 90.0 | 93.0 | 39 |
| | 1015 | 20 | 17 | 17 | 1.000 | 0.700 | 3.0 | 90.0 | 93.0 | 51 |
| | 1215 | 20 | 17 | 21 | 0.810 | 0.700 | 3.0 | 90.0 | 93.0 | 51 |
| | 1500 | 15 | 7 | 10 | 0.700 | 0.700 | 3.0 | 90.0 | 93.0 | 28 |
| | 1922 | 10 | 5 | 5 | 1.000 | 0.700 | 3.0 | 90.0 | 93.0 | 30 |
| | 1940 | 20 | 20 | 25 | 0.800 | 0.700 | 3.0 | 90.0 | 93.0 | 60 |
| | 2000 | 15 | 1 | 0 | -- | 0.700 | 3.0 | 90.0 | 93.0 | 4 |
| | 2110 | 30 | 31 | 35 | 0.886 | 0.700 | 3.0 | 90.0 | 93.0 | 62 |
| | 2200 | 20 | 11 | 10 | 1.100 | 0.700 | 3.0 | 90.0 | 93.0 | 33 |
| | 2309 | 31 | 46 | 54 | 0.852 | 0.700 | 3.0 | 90.0 | 93.0 | 89 |
| 31 Aug | 13 | 30 | 39 | 42 | 0.929 | 0.700 | 3.0 | 90.0 | 93.0 | 78 |
| | 200 | 20 | 18 | 20 | 0.900 | 0.700 | 3.0 | 90.0 | 93.0 | 54 |
| | 550 | 10 | 7 | 8 | 0.875 | 0.700 | 3.0 | 90.0 | 93.0 | 42 |
| | 600 | 10 | 16 | 21 | 0.762 | 0.700 | 3.0 | 90.0 | 93.0 | 96 |
| | 610 | 20 | 20 | 18 | 1.111 | 0.760 | 3.0 | 90.0 | 93.0 | 60 |
| | 745 | 15 | 8 | 18 | 0.444 | 0.760 | 3.0 | 90.0 | 93.0 | 32 |
| | 800 | 15 | 5 | 7 | 0.714 | 0.760 | 3.0 | 90.0 | 93.0 | 20 |
| | 1230 | 15 | 1 | 1 | 1.000 | 0.760 | 3.0 | 90.0 | 93.0 | 4 |
| | 1815 | 15 | 1 | 1 | 1.000 | 0.760 | 3.0 | 90.0 | 93.0 | 4 |
| | 1915 | 15 | 3 | 3 | 1.000 | 0.760 | 3.0 | 90.0 | 93.0 | 12 |
| | 2001 | 15 | 9 | 12 | 0.750 | 0.760 | 3.0 | 90.0 | 93.0 | 36 |
| | 2129 | 28 | 54 | 65 | 0.831 | 0.730 | 3.0 | 90.0 | 93.0 | 116 |
| | 2300 | 15 | 6 | 6 | 1.000 | 0.730 | 3.0 | 90.0 | 93.0 | 24 |
| 01 Sep | 5 | 20 | 19 | 21 | 0.905 | 0.730 | 3.0 | 90.0 | 93.0 | 57 |
| | 200 | 30 | 81 | 91 | 0.890 | 0.730 | 3.0 | 90.0 | 93.0 | 162 |
| | 515 | 30 | 77 | 80 | 0.963 | 0.790 | 3.0 | 90.0 | 93.0 | 154 |
| | 615 | 15 | 29 | 37 | 0.784 | 0.790 | 3.0 | 90.0 | 93.0 | 116 |
| | 630 | 15 | 10 | 9 | 1.111 | 0.790 | 3.0 | 90.0 | 93.0 | 40 |
| | 815 | 15 | 2 | 1 | 2.000 | 0.790 | 3.0 | 90.0 | 93.0 | 8 |
| | 1215 | 15 | 1 | 0 | -- | 0.790 | 3.0 | 90.0 | 93.0 | 4 |
| | 1712 | 15 | 2 | 3 | 0.667 | 0.790 | 3.0 | 90.0 | 93.0 | 8 |
| | 1915 | 15 | 0 | 0 | -- | 0.790 | 3.0 | 90.0 | 93.0 | 0 |
| | 2010 | 15 | 9 | 8 | 1.125 | 0.790 | 3.0 | 90.0 | 93.0 | 36 |
| | 2136 | 20 | 19 | 25 | 0.760 | 0.790 | 3.0 | 90.0 | 93.0 | 57 |
| | 2220 | 15 | 9 | 11 | 0.818 | 0.730 | 3.0 | 90.0 | 93.0 | 36 |
| | 2303 | 21 | 19 | 18 | 1.056 | 0.730 | 3.0 | 90.0 | 93.0 | 54 |
| 02 Sep | 27 | 30 | 91 | 104 | 0.875 | 0.730 | 3.0 | 90.0 | 93.0 | 182 |
| | 201 | 31 | 45 | 49 | 0.918 | 0.730 | 3.0 | 90.0 | 93.0 | 87 |
| | 515 | 10 | 37 | 50 | 0.740 | 0.730 | 3.0 | 90.0 | 93.0 | 222 |
| | 530 | 20 | 54 | 54 | 1.000 | 0.800 | 3.0 | 90.0 | 93.0 | 162 |
| | 605 | 30 | 59 | 57 | 1.035 | 0.800 | 3.0 | 90.0 | 93.0 | 118 |
| | 830 | 30 | 39 | 43 | 0.907 | 0.800 | 3.0 | 90.0 | 93.0 | 78 |
| | 1215 | 25 | 10 | 18 | 0.556 | 0.800 | 3.0 | 90.0 | 93.0 | 24 |
| | 1710 | 15 | 5 | 4 | 1.250 | 0.800 | 3.0 | 90.0 | 93.0 | 20 |
| | 1930 | 15 | 4 | 4 | 1.000 | 0.800 | 3.0 | 90.0 | 93.0 | 16 |
| | 2045 | 10 | 20 | 20 | 1.000 | 0.800 | 3.0 | 90.0 | 93.0 | 120 |
| | 2140 | 10 | 33 | 24 | 1.375 | 0.750 | 3.0 | 90.0 | 93.0 | 198 |
| | 2230 | 25 | 41 | 49 | 0.837 | 0.750 | 3.0 | 90.0 | 93.0 | 98 |
| | 2305 | 20 | 17 | 18 | 0.944 | 0.770 | 3.0 | 90.0 | 93.0 | 51 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 03 Sep | 20 | 30 | 53 | 47 | 1.128 | 0.770 | 3.0 | 90.0 | 93.0 | 106 |
| | 130 | 20 | 54 | 52 | 1.038 | 0.770 | 3.0 | 90.0 | 93.0 | 162 |
| | 205 | 15 | 51 | 56 | 0.911 | 0.770 | 3.0 | 90.0 | 93.0 | 204 |
| | 512 | 15 | 90 | 92 | 0.978 | 0.770 | 3.0 | 90.0 | 93.0 | 360 |
| | 604 | 30 | 48 | 48 | 1.000 | 0.770 | 3.0 | 90.0 | 93.0 | 96 |
| | 721 | 30 | 48 | 50 | 0.960 | 0.770 | 3.0 | 90.0 | 93.0 | 96 |
| | 908 | 31 | 37 | 46 | 0.804 | 0.770 | 3.0 | 90.0 | 93.0 | 72 |
| | 941 | 15 | 5 | 5 | 1.000 | 0.800 | 3.0 | 90.0 | 93.0 | 20 |
| | 1200 | 15 | 6 | 7 | 0.857 | 0.800 | 3.0 | 90.0 | 93.0 | 24 |
| | 1519 | 15 | 0 | 0 | -- | 0.800 | 3.0 | 90.0 | 93.0 | 0 |
| | 1912 | 16 | 5 | 4 | 1.250 | 0.800 | 3.0 | 90.0 | 93.0 | 19 |
| | 2110 | 20 | 19 | 22 | 0.864 | 0.800 | 3.0 | 90.0 | 93.0 | 57 |
| | 2201 | 11 | 14 | 16 | 0.875 | 0.800 | 3.0 | 90.0 | 93.0 | 76 |
| | 2213 | 30 | 36 | 39 | 0.923 | 0.800 | 3.0 | 90.0 | 93.0 | 72 |
| | 2300 | 30 | 58 | 53 | 1.094 | 0.800 | 3.0 | 90.0 | 93.0 | 116 |
| 04 Sep | 1 | 20 | 25 | 17 | 1.471 | 0.800 | 3.0 | 90.0 | 93.0 | 75 |
| | 22 | 15 | 22 | 26 | 0.846 | 0.700 | 3.0 | 90.0 | 93.0 | 88 |
| | 200 | 30 | 75 | 71 | 1.056 | 0.730 | 3.0 | 90.0 | 93.0 | 150 |
| | 515 | 20 | 104 | 109 | 0.954 | 0.730 | 3.0 | 90.0 | 93.0 | 312 |
| | 615 | 20 | 62 | 62 | 1.000 | 0.730 | 3.0 | 90.0 | 93.0 | 186 |
| | 715 | 5 | 20 | 36 | 0.556 | 0.730 | 3.0 | 90.0 | 93.0 | 240 |
| | 725 | 25 | 62 | 66 | 0.939 | 0.800 | 3.0 | 90.0 | 93.0 | 149 |
| | 815 | 30 | 58 | 59 | 0.983 | 0.800 | 3.0 | 90.0 | 93.0 | 116 |
| | 1220 | 15 | 5 | 6 | 0.833 | 0.800 | 3.0 | 90.0 | 93.0 | 20 |
| | 1918 | 21 | 18 | 16 | 1.125 | 0.800 | 3.0 | 90.0 | 93.0 | 51 |
| | 2030 | 15 | 6 | 6 | 1.000 | 0.800 | 3.0 | 90.0 | 93.0 | 24 |
| | 2108 | 20 | 19 | 22 | 0.864 | 0.800 | 3.0 | 90.0 | 93.0 | 57 |
| | 2208 | 20 | 81 | 93 | 0.871 | 0.800 | 3.0 | 90.0 | 93.0 | 243 |
| | 2300 | 15 | 55 | 55 | 1.000 | 0.800 | 3.0 | 90.0 | 93.0 | 220 |
| 05 Sep | 1 | 15 | 63 | 61 | 1.033 | 0.800 | 3.0 | 90.0 | 93.0 | 252 |
| | 101 | 20 | 58 | 53 | 1.094 | 0.800 | 3.0 | 90.0 | 93.0 | 174 |
| | 200 | 15 | 69 | 76 | 0.908 | 0.800 | 3.0 | 90.0 | 93.0 | 276 |
| | 515 | 20 | 75 | 81 | 0.926 | 0.800 | 3.0 | 90.0 | 93.0 | 225 |
| | 615 | 30 | 59 | 67 | 0.881 | 0.800 | 3.0 | 90.0 | 93.0 | 118 |
| | 715 | 30 | 46 | 50 | 0.920 | 0.800 | 3.0 | 90.0 | 93.0 | 92 |
| | 815 | 30 | 47 | 48 | 0.979 | 0.800 | 3.0 | 90.0 | 93.0 | 94 |
| | 1215 | 20 | 18 | 19 | 0.947 | 0.800 | 3.0 | 90.0 | 93.0 | 54 |
| | 1515 | 15 | 12 | 11 | 1.091 | 0.800 | 3.0 | 90.0 | 93.0 | 48 |
| | 1800 | 20 | 19 | 21 | 0.905 | 0.800 | 3.0 | 90.0 | 93.0 | 57 |
| | 1915 | 30 | 31 | 34 | 0.912 | 0.800 | 3.0 | 90.0 | 93.0 | 62 |
| | 2005 | 15 | 9 | 14 | 0.643 | 0.800 | 3.0 | 90.0 | 93.0 | 36 |
| | 2030 | 5 | 14 | 18 | 0.778 | 0.800 | 3.0 | 90.0 | 93.0 | 168 |
| | 2100 | 30 | 45 | 51 | 0.882 | 0.800 | 3.0 | 90.0 | 93.0 | 90 |
| | 2204 | 15 | 54 | 55 | 0.982 | 0.800 | 3.0 | 90.0 | 93.0 | 216 |
| | 2302 | 15 | 57 | 57 | 1.000 | 0.800 | 3.0 | 90.0 | 93.0 | 228 |
| 06 Sep | 14 | 20 | 58 | 56 | 1.036 | 0.800 | 3.0 | 90.0 | 93.0 | 174 |
| | 100 | 21 | 57 | 52 | 1.096 | 0.800 | 3.0 | 90.0 | 93.0 | 163 |
| | 202 | 15 | 59 | 55 | 1.073 | 0.800 | 3.0 | 90.0 | 93.0 | 236 |
| | 530 | 20 | 56 | 63 | 0.889 | 0.800 | 3.0 | 90.0 | 93.0 | 168 |
| | 600 | 15 | 50 | 56 | 0.893 | 0.800 | 3.0 | 90.0 | 93.0 | 200 |
| | 730 | 30 | 69 | 85 | 0.812 | 0.800 | 3.0 | 90.0 | 93.0 | 138 |
| | 815 | 30 | 55 | 63 | 0.873 | 0.820 | 3.0 | 90.0 | 93.0 | 110 |
| | 1135 | 15 | 7 | 6 | 1.167 | 0.820 | 3.0 | 90.0 | 93.0 | 28 |
| | 1440 | 15 | 8 | 16 | 0.500 | 0.820 | 3.0 | 90.0 | 93.0 | 32 |
| | 1930 | 15 | 36 | 37 | 0.973 | 0.820 | 3.0 | 90.0 | 93.0 | 144 |
| | 2025 | 15 | 61 | 63 | 0.968 | 0.820 | 3.0 | 90.0 | 93.0 | 244 |
| | 2110 | 15 | 54 | 64 | 0.844 | 0.820 | 3.0 | 90.0 | 93.0 | 216 |
| | 2213 | 16 | 56 | 62 | 0.903 | 0.820 | 3.0 | 90.0 | 93.0 | 210 |
| | 2302 | 16 | 73 | 81 | 0.901 | 0.820 | 3.0 | 90.0 | 93.0 | 274 |
| 07 Sep | 1 | 31 | 68 | 79 | 0.861 | 0.820 | 3.0 | 90.0 | 93.0 | 132 |
| | 203 | 15 | 80 | 72 | 1.111 | 0.820 | 3.0 | 90.0 | 93.0 | 320 |
| | 515 | 15 | 56 | 60 | 0.933 | 0.820 | 3.0 | 90.0 | 93.0 | 224 |
| | 615 | 20 | 59 | 83 | 0.711 | 0.820 | 3.0 | 90.0 | 93.0 | 177 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 640 | 10 | 40 | 39 | 1.026 | 0.880 | 3.0 | 90.0 | 93.0 | 240 |
| | 730 | 20 | 59 | 69 | 0.855 | 0.880 | 3.0 | 90.0 | 93.0 | 177 |
| | 810 | 15 | 52 | 60 | 0.867 | 0.880 | 3.0 | 90.0 | 93.0 | 208 |
| | 1200 | 25 | 56 | 62 | 0.903 | 0.880 | 3.0 | 90.0 | 93.0 | 134 |
| | 1614 | 15 | 8 | 9 | 0.889 | 0.880 | 3.0 | 90.0 | 93.0 | 32 |
| | 1830 | 15 | 10 | 8 | 1.250 | 0.880 | 3.0 | 90.0 | 93.0 | 40 |
| | 1915 | 15 | 17 | 8 | 2.125 | 0.880 | 3.0 | 90.0 | 93.0 | 68 |
| | 1935 | 20 | 25 | 21 | 1.190 | 0.770 | 3.0 | 90.0 | 93.0 | 75 |
| | 2005 | 20 | 55 | 53 | 1.038 | 0.770 | 3.0 | 90.0 | 93.0 | 165 |
| | 2107 | 21 | 56 | 60 | 0.933 | 0.770 | 3.0 | 90.0 | 93.0 | 160 |
| | 2200 | 15 | 56 | 51 | 1.098 | 0.770 | 3.0 | 90.0 | 93.0 | 224 |
| | 2302 | 15 | 50 | 42 | 1.190 | 0.770 | 3.0 | 90.0 | 93.0 | 200 |
| | 2318 | 10 | 44 | 44 | 1.000 | 0.730 | 3.0 | 90.0 | 93.0 | 264 |
| 08 Sep | 2 | 15 | 81 | 84 | 0.964 | 0.730 | 3.0 | 90.0 | 93.0 | 324 |
| | 106 | 15 | 80 | 79 | 1.013 | 0.730 | 3.0 | 90.0 | 93.0 | 320 |
| | 201 | 15 | 77 | 82 | 0.939 | 0.730 | 3.0 | 90.0 | 93.0 | 308 |
| | 515 | 15 | 53 | 59 | 0.898 | 0.730 | 3.0 | 90.0 | 93.0 | 212 |
| | 600 | 10 | 28 | 36 | 0.778 | 0.730 | 3.0 | 90.0 | 93.0 | 168 |
| | 625 | 15 | 53 | 62 | 0.855 | 0.810 | 3.0 | 90.0 | 93.0 | 212 |
| | 720 | 20 | 58 | 73 | 0.795 | 0.810 | 3.0 | 90.0 | 93.0 | 174 |
| | 800 | 30 | 52 | 47 | 1.106 | 0.860 | 3.0 | 90.0 | 93.0 | 104 |
| | 1215 | 15 | 11 | 12 | 0.917 | 0.860 | 3.0 | 90.0 | 93.0 | 44 |
| | 1504 | 15 | 5 | 5 | 1.000 | 0.860 | 3.0 | 90.0 | 93.0 | 20 |
| | 1845 | 15 | 17 | 19 | 0.895 | 0.860 | 3.0 | 90.0 | 93.0 | 68 |
| | 1915 | 15 | 8 | 14 | 0.571 | 0.860 | 3.0 | 90.0 | 93.0 | 32 |
| | 2000 | 20 | 54 | 56 | 0.964 | 0.860 | 3.0 | 90.0 | 93.0 | 162 |
| | 2105 | 15 | 97 | 88 | 1.102 | 0.860 | 3.0 | 90.0 | 93.0 | 388 |
| | 2202 | 20 | 67 | 62 | 1.081 | 0.860 | 3.0 | 90.0 | 93.0 | 201 |
| | 2305 | 15 | 51 | 48 | 1.063 | 0.860 | 3.0 | 90.0 | 93.0 | 204 |
| 09 Sep | 7 | 15 | 71 | 62 | 1.145 | 0.860 | 3.0 | 90.0 | 93.0 | 284 |
| | 27 | 15 | 71 | 69 | 1.029 | 0.770 | 3.0 | 90.0 | 93.0 | 284 |
| | 100 | 15 | 54 | 51 | 1.059 | 0.770 | 3.0 | 90.0 | 93.0 | 216 |
| | 205 | 15 | 73 | 71 | 1.028 | 0.770 | 3.0 | 90.0 | 93.0 | 292 |
| | 530 | 10 | 56 | 76 | 0.737 | 0.770 | 3.0 | 90.0 | 93.0 | 336 |
| | 545 | 10 | 50 | 69 | 0.725 | 0.820 | 3.0 | 90.0 | 93.0 | 300 |
| | 600 | 15 | 73 | 83 | 0.880 | 0.860 | 3.0 | 90.0 | 93.0 | 292 |
| | 640 | 10 | 45 | 68 | 0.662 | 0.860 | 3.0 | 90.0 | 93.0 | 270 |
| | 725 | 19 | 106 | 126 | 0.841 | 0.895 | 3.0 | 90.0 | 93.0 | 335 |
| | 815 | 20 | 71 | 79 | 0.899 | 0.920 | 3.0 | 90.0 | 93.0 | 213 |
| | 1230 | 30 | 51 | 51 | 1.000 | 0.920 | 3.0 | 90.0 | 93.0 | 102 |
| | 1507 | 15 | 9 | 9 | 1.000 | 0.920 | 3.0 | 90.0 | 93.0 | 36 |
| | 1815 | 30 | 48 | 55 | 0.873 | 0.920 | 3.0 | 90.0 | 93.0 | 96 |
| | 1930 | 20 | 52 | 48 | 1.083 | 0.920 | 3.0 | 90.0 | 93.0 | 156 |
| | 2015 | 30 | 59 | 54 | 1.093 | 0.920 | 3.0 | 90.0 | 93.0 | 118 |
| | 2112 | 15 | 78 | 75 | 1.040 | 0.920 | 3.0 | 90.0 | 93.0 | 312 |
| | 2201 | 15 | 58 | 62 | 0.935 | 0.920 | 3.0 | 90.0 | 93.0 | 232 |
| | 2300 | 15 | 75 | 68 | 1.103 | 0.920 | 3.0 | 90.0 | 93.0 | 300 |
| 10 Sep | 2 | 15 | 57 | 52 | 1.096 | 0.920 | 3.0 | 90.0 | 93.0 | 228 |
| | 102 | 20 | 52 | 47 | 1.106 | 0.900 | 3.0 | 90.0 | 93.0 | 156 |
| | 202 | 15 | 73 | 69 | 1.058 | 0.900 | 3.0 | 90.0 | 93.0 | 292 |
| | 530 | 15 | 73 | 86 | 0.849 | 0.900 | 3.0 | 90.0 | 93.0 | 292 |
| | 550 | 5 | 11 | 8 | 1.375 | 0.900 | 3.0 | 90.0 | 93.0 | 132 |
| | 600 | 20 | 98 | 101 | 0.970 | 0.900 | 3.0 | 90.0 | 93.0 | 294 |
| | 740 | 20 | 61 | 59 | 1.034 | 0.900 | 3.0 | 90.0 | 93.0 | 183 |
| | 835 | 25 | 37 | 33 | 1.121 | 0.900 | 3.0 | 90.0 | 93.0 | 89 |
| | 1230 | 15 | 6 | 8 | 0.750 | 0.900 | 3.0 | 90.0 | 93.0 | 24 |
| | 1522 | 15 | 28 | 17 | 1.647 | 0.900 | 3.0 | 90.0 | 93.0 | 112 |
| | 1539 | 3 | 10 | 11 | 0.909 | 0.750 | 3.0 | 90.0 | 93.0 | 200 |
| | 1543 | 15 | 27 | 27 | 1.000 | 0.750 | 3.0 | 90.0 | 93.0 | 108 |
| | 1825 | 30 | 40 | 52 | 0.769 | 0.750 | 3.0 | 90.0 | 93.0 | 80 |
| | 1945 | 15 | 26 | 26 | 1.000 | 0.750 | 3.0 | 90.0 | 93.0 | 104 |
| | 2005 | 25 | 63 | 72 | 0.875 | 0.750 | 3.0 | 90.0 | 93.0 | 151 |
| | 2100 | 22 | 60 | 63 | 0.952 | 0.750 | 3.0 | 90.0 | 93.0 | 164 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2204 | 15 | 62 | 68 | 0.912 | 0.750 | 3.0 | 90.0 | 93.0 | 248 |
| | 2304 | 15 | 69 | 75 | 0.920 | 0.750 | 3.0 | 90.0 | 93.0 | 276 |
| 11 Sep | 1 | 15 | 63 | 63 | 1.000 | 0.750 | 3.0 | 90.0 | 93.0 | 252 |
| | 102 | 20 | 65 | 76 | 0.855 | 0.750 | 3.0 | 90.0 | 93.0 | 195 |
| | 200 | 15 | 69 | 84 | 0.821 | 0.750 | 3.0 | 90.0 | 93.0 | 276 |
| | 217 | 10 | 33 | 34 | 0.971 | 0.830 | 3.0 | 90.0 | 93.0 | 198 |
| | 530 | 20 | 62 | 67 | 0.925 | 0.830 | 3.0 | 90.0 | 93.0 | 186 |
| | 625 | 20 | 52 | 56 | 0.929 | 0.830 | 3.0 | 90.0 | 93.0 | 156 |
| | 725 | 20 | 51 | 61 | 0.836 | 0.830 | 3.0 | 90.0 | 93.0 | 153 |
| | 800 | 30 | 59 | 58 | 1.017 | 0.850 | 3.0 | 90.0 | 93.0 | 118 |
| | 1235 | 25 | 45 | 52 | 0.865 | 0.850 | 3.0 | 90.0 | 93.0 | 108 |
| | 1500 | 10 | 13 | 26 | 0.500 | 0.850 | 3.0 | 90.0 | 93.0 | 78 |
| | 1510 | 10 | 20 | 20 | 1.000 | 0.900 | 3.0 | 90.0 | 93.0 | 120 |
| | 1805 | 30 | 44 | 37 | 1.189 | 0.900 | 3.0 | 90.0 | 93.0 | 88 |
| | 1905 | 30 | 56 | 58 | 0.966 | 0.875 | 3.0 | 90.0 | 93.0 | 112 |
| | 2005 | 20 | 51 | 58 | 0.879 | 0.875 | 3.0 | 90.0 | 93.0 | 153 |
| | 2110 | 15 | 51 | 47 | 1.085 | 0.875 | 3.0 | 90.0 | 93.0 | 204 |
| | 2201 | 15 | 65 | 69 | 0.942 | 0.875 | 3.0 | 90.0 | 93.0 | 260 |
| | 2307 | 31 | 76 | 83 | 0.916 | 0.875 | 3.0 | 90.0 | 93.0 | 147 |
| 12 Sep | 1 | 30 | 72 | 76 | 0.947 | 0.875 | 3.0 | 90.0 | 93.0 | 144 |
| | 104 | 15 | 73 | 71 | 1.028 | 0.875 | 3.0 | 90.0 | 93.0 | 292 |
| | 200 | 15 | 50 | 45 | 1.111 | 0.875 | 3.0 | 90.0 | 93.0 | 200 |
| | 525 | 20 | 55 | 54 | 1.019 | 0.875 | 3.0 | 90.0 | 93.0 | 165 |
| | 625 | 20 | 58 | 53 | 1.094 | 0.875 | 3.0 | 90.0 | 93.0 | 174 |
| | 730 | 25 | 52 | 53 | 0.981 | 0.875 | 3.0 | 90.0 | 93.0 | 125 |
| | 810 | 20 | 59 | 67 | 0.881 | 0.875 | 3.0 | 90.0 | 93.0 | 177 |
| | 1205 | 20 | 16 | 18 | 0.889 | 0.875 | 3.0 | 90.0 | 93.0 | 48 |
| | 1503 | 30 | 35 | 39 | 0.897 | 0.875 | 3.0 | 90.0 | 93.0 | 70 |
| | 1825 | 15 | 34 | 45 | 0.756 | 0.875 | 3.0 | 90.0 | 93.0 | 136 |
| | 1840 | 15 | 44 | 37 | 1.189 | 0.875 | 3.0 | 90.0 | 93.0 | 176 |
| | 2020 | 25 | 45 | 44 | 1.023 | 0.875 | 2.0 | 90.0 | 92.0 | 108 |
| | 2113 | 20 | 69 | 68 | 1.015 | 0.875 | 2.0 | 90.0 | 92.0 | 207 |
| | 2204 | 30 | 52 | 51 | 1.020 | 0.875 | 2.0 | 90.0 | 92.0 | 104 |
| | 2301 | 20 | 56 | 55 | 1.018 | 0.875 | 2.0 | 90.0 | 92.0 | 168 |
| 13 Sep | 6 | 30 | 60 | 61 | 0.984 | 0.875 | 2.0 | 90.0 | 92.0 | 120 |
| | 103 | 31 | 61 | 65 | 0.938 | 0.875 | 2.0 | 90.0 | 92.0 | 118 |
| | 201 | 30 | 42 | 43 | 0.977 | 0.875 | 2.0 | 90.0 | 92.0 | 84 |
| | 515 | 30 | 61 | 55 | 1.109 | 0.875 | 2.0 | 90.0 | 92.0 | 122 |
| | 630 | 30 | 46 | 45 | 1.022 | 0.875 | 2.0 | 90.0 | 92.0 | 92 |
| | 730 | 30 | 51 | 45 | 1.133 | 0.875 | 2.0 | 90.0 | 92.0 | 102 |
| | 810 | 10 | 18 | 13 | 1.385 | 0.875 | 2.0 | 90.0 | 92.0 | 108 |
| | 820 | 15 | 23 | 22 | 1.045 | 0.800 | 2.0 | 90.0 | 92.0 | 92 |
| | 1145 | 15 | 11 | 10 | 1.100 | 0.800 | 2.0 | 90.0 | 92.0 | 44 |
| | 1600 | 30 | 53 | 54 | 0.981 | 0.800 | 2.0 | 90.0 | 92.0 | 106 |
| | 1807 | 30 | 55 | 56 | 0.982 | 0.800 | 2.0 | 90.0 | 92.0 | 110 |
| | 1935 | 15 | 25 | 17 | 1.471 | 0.800 | 2.0 | 90.0 | 92.0 | 100 |
| | 1950 | 10 | 9 | 5 | 1.800 | 0.760 | 2.0 | 90.0 | 92.0 | 54 |
| | 2000 | 30 | 47 | 34 | 1.382 | 0.760 | 2.0 | 90.0 | 92.0 | 94 |
| | 2035 | 10 | 28 | 20 | 1.400 | 0.700 | 2.0 | 90.0 | 92.0 | 168 |
| | 2131 | 20 | 60 | 55 | 1.091 | 0.700 | 2.0 | 90.0 | 92.0 | 180 |
| | 2210 | 15 | 54 | 50 | 1.080 | 0.700 | 2.0 | 90.0 | 92.0 | 216 |
| | 2301 | 20 | 56 | 49 | 1.143 | 0.700 | 2.0 | 90.0 | 92.0 | 168 |
| | 2323 | 10 | 24 | 24 | 1.000 | 0.680 | 2.0 | 90.0 | 92.0 | 144 |
| 14 Sep | 8 | 30 | 51 | 52 | 0.981 | 0.680 | 2.0 | 90.0 | 92.0 | 102 |
| | 110 | 15 | 100 | 111 | 0.901 | 0.680 | 2.0 | 90.0 | 92.0 | 400 |
| | 201 | 15 | 64 | 63 | 1.016 | 0.680 | 2.0 | 90.0 | 92.0 | 256 |
| | 525 | 20 | 54 | 59 | 0.915 | 0.680 | 2.0 | 90.0 | 92.0 | 162 |
| | 615 | 20 | 52 | 54 | 0.963 | 0.680 | 2.0 | 90.0 | 92.0 | 156 |
| | 715 | 30 | 51 | 61 | 0.836 | 0.680 | 2.0 | 90.0 | 92.0 | 102 |
| | 815 | 25 | 43 | 40 | 1.075 | 0.680 | 2.0 | 90.0 | 92.0 | 103 |
| | 1510 | 20 | 15 | 15 | 1.000 | 0.680 | 2.0 | 90.0 | 92.0 | 45 |
| | 1800 | 30 | 38 | 31 | 1.226 | 0.680 | 2.0 | 90.0 | 92.0 | 76 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1915 | 30 | 44 | 46 | 0.957 | 0.680 | 2.0 | 90.0 | 92.0 | 88 |
| | 2015 | 20 | 20 | 10 | 2.000 | 0.680 | 2.0 | 90.0 | 92.0 | 60 |
| | 2120 | 30 | 41 | 39 | 1.051 | 0.680 | 2.0 | 90.0 | 92.0 | 82 |
| | 2201 | 20 | 50 | 45 | 1.111 | 0.680 | 2.0 | 90.0 | 92.0 | 150 |
| | 2301 | 30 | 52 | 51 | 1.020 | 0.680 | 2.0 | 90.0 | 92.0 | 104 |
| 15 Sep | 2 | 15 | 72 | 70 | 1.029 | 0.680 | 2.0 | 90.0 | 92.0 | 288 |
| | 110 | 20 | 57 | 58 | 0.983 | 0.680 | 2.0 | 90.0 | 92.0 | 171 |
| | 201 | 15 | 54 | 53 | 1.019 | 0.680 | 2.0 | 90.0 | 92.0 | 216 |
| | 530 | 30 | 55 | 55 | 1.000 | 0.680 | 2.0 | 90.0 | 92.0 | 110 |
| | 630 | 30 | 26 | 31 | 0.839 | 0.680 | 2.0 | 90.0 | 92.0 | 52 |
| | 715 | 30 | 49 | 49 | 1.000 | 0.680 | 2.0 | 90.0 | 92.0 | 98 |
| | 815 | 15 | 24 | 33 | 0.727 | 0.680 | 2.0 | 90.0 | 92.0 | 96 |
| | 831 | 15 | 6 | 5 | 1.200 | 0.680 | 2.0 | 90.0 | 92.0 | 24 |
| | 1240 | 15 | 2 | 2 | 1.000 | 0.680 | 2.0 | 90.0 | 92.0 | 8 |
| | 1510 | 15 | 5 | 5 | 1.000 | 0.680 | 2.0 | 90.0 | 92.0 | 20 |
| | 1703 | 30 | 42 | 44 | 0.955 | 0.680 | 2.0 | 90.0 | 92.0 | 84 |
| | 1805 | 20 | 13 | 12 | 1.083 | 0.680 | 2.0 | 90.0 | 92.0 | 39 |
| | 1930 | 30 | 29 | 32 | 0.906 | 0.680 | 2.0 | 90.0 | 92.0 | 58 |
| | 2005 | 15 | 10 | 11 | 0.909 | 0.680 | 2.0 | 90.0 | 92.0 | 40 |
| | 2136 | 23 | 46 | 48 | 0.958 | 0.680 | 2.0 | 90.0 | 92.0 | 120 |
| | 2204 | 30 | 68 | 68 | 1.000 | 0.680 | 2.0 | 90.0 | 92.0 | 136 |
| | 2303 | 30 | 74 | 79 | 0.937 | 0.680 | 2.0 | 90.0 | 92.0 | 148 |
| 16 Sep | 3 | 30 | 52 | 55 | 0.945 | 0.680 | 2.0 | 90.0 | 92.0 | 104 |
| | 101 | 31 | 44 | 48 | 0.917 | 0.680 | 2.0 | 90.0 | 92.0 | 85 |
| | 206 | 30 | 55 | 62 | 0.887 | 0.680 | 2.0 | 90.0 | 92.0 | 110 |
| | 530 | 10 | 27 | 44 | 0.614 | 0.680 | 2.0 | 90.0 | 92.0 | 162 |
| | 540 | 10 | 34 | 51 | 0.667 | 0.750 | 2.0 | 90.0 | 92.0 | 204 |
| | 615 | 15 | 59 | 64 | 0.922 | 0.790 | 2.0 | 90.0 | 92.0 | 236 |
| | 735 | 25 | 34 | 39 | 0.872 | 0.790 | 2.0 | 90.0 | 92.0 | 82 |
| | 820 | 15 | 11 | 19 | 0.579 | 0.790 | 2.0 | 90.0 | 92.0 | 44 |
| | 835 | 15 | 12 | 9 | 1.333 | 0.790 | 2.0 | 90.0 | 92.0 | 48 |
| | 1105 | 15 | 8 | 11 | 0.727 | 0.790 | 2.0 | 90.0 | 92.0 | 32 |
| | 1550 | 10 | 1 | 2 | 0.500 | 0.790 | 2.0 | 90.0 | 92.0 | 6 |
| | 1600 | 10 | 11 | 12 | 0.917 | 0.790 | 2.0 | 90.0 | 92.0 | 66 |
| | 1703 | 15 | 9 | 10 | 0.900 | 0.790 | 2.0 | 90.0 | 92.0 | 36 |
| | 1801 | 30 | 24 | 25 | 0.960 | 0.790 | 2.0 | 90.0 | 92.0 | 48 |
| | 1920 | 30 | 41 | 41 | 1.000 | 0.790 | 2.0 | 90.0 | 92.0 | 82 |
| | 2010 | 40 | 89 | 91 | 0.978 | 0.790 | 2.0 | 90.0 | 92.0 | 134 |
| | 2113 | 30 | 93 | 96 | 0.969 | 0.790 | 2.0 | 90.0 | 92.0 | 186 |
| | 2201 | 30 | 35 | 38 | 0.921 | 0.790 | 2.0 | 90.0 | 92.0 | 70 |
| | 2302 | 30 | 70 | 75 | 0.933 | 0.790 | 2.0 | 90.0 | 92.0 | 140 |
| 17 Sep | 3 | 31 | 63 | 68 | 0.926 | 0.790 | 2.0 | 90.0 | 92.0 | 122 |
| | 103 | 20 | 58 | 62 | 0.935 | 0.790 | 2.0 | 90.0 | 92.0 | 174 |
| | 203 | 30 | 60 | 58 | 1.034 | 0.790 | 2.0 | 90.0 | 92.0 | 120 |
| | 530 | 10 | 23 | 37 | 0.622 | 0.790 | 2.0 | 90.0 | 92.0 | 138 |
| | 540 | 20 | 43 | 48 | 0.896 | 0.890 | 2.0 | 90.0 | 92.0 | 129 |
| | 630 | 15 | 51 | 91 | 0.560 | 0.890 | 2.0 | 90.0 | 92.0 | 204 |
| | 645 | 30 | 25 | 28 | 0.893 | 0.950 | 2.0 | 90.0 | 92.0 | 50 |
| | 725 | 30 | 76 | 90 | 0.844 | 0.950 | 2.0 | 90.0 | 92.0 | 152 |
| | 830 | 20 | 29 | 30 | 0.967 | 0.975 | 2.0 | 90.0 | 92.0 | 87 |
| | 1210 | 15 | 17 | 16 | 1.063 | 0.975 | 2.0 | 90.0 | 92.0 | 68 |
| | 1530 | 20 | 6 | 5 | 1.200 | 0.975 | 2.0 | 90.0 | 92.0 | 18 |
| | 1702 | 30 | 20 | 19 | 1.053 | 0.975 | 2.0 | 90.0 | 92.0 | 40 |
| | 1803 | 15 | 35 | 32 | 1.094 | 0.975 | 2.0 | 90.0 | 92.0 | 140 |
| | 1925 | 15 | 18 | 14 | 1.286 | 0.975 | 2.0 | 90.0 | 92.0 | 72 |
| | 1940 | 15 | 28 | 28 | 1.000 | 0.875 | 2.0 | 90.0 | 92.0 | 112 |
| | 2035 | 20 | 30 | 29 | 1.034 | 0.875 | 2.0 | 90.0 | 92.0 | 90 |
| | 2124 | 20 | 86 | 88 | 0.977 | 0.875 | 2.0 | 90.0 | 92.0 | 258 |
| | 2202 | 20 | 62 | 52 | 1.192 | 0.875 | 2.0 | 90.0 | 92.0 | 186 |
| | 2223 | 15 | 36 | 36 | 1.000 | 0.805 | 2.0 | 90.0 | 92.0 | 144 |
| | 2301 | 15 | 81 | 86 | 0.942 | 0.805 | 2.0 | 90.0 | 92.0 | 324 |
| 18 Sep | 26 | 20 | 49 | 55 | 0.891 | 0.805 | 2.0 | 90.0 | 92.0 | 147 |
| | 102 | 30 | 69 | 76 | 0.908 | 0.805 | 2.0 | 90.0 | 92.0 | 138 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 204 | 15 | 63 | 72 | 0.875 | 0.815 | 3.0 | 90.0 | 93.0 | 252 |
| | 520 | 15 | 7 | 8 | 0.875 | 0.815 | 3.0 | 90.0 | 93.0 | 28 |
| | 610 | 30 | 58 | 67 | 0.866 | 0.815 | 3.0 | 90.0 | 93.0 | 116 |
| | 700 | 15 | 20 | 31 | 0.645 | 0.815 | 3.0 | 90.0 | 93.0 | 80 |
| | 715 | 15 | 30 | 43 | 0.698 | 0.955 | 3.0 | 90.0 | 93.0 | 120 |
| | 810 | 20 | 9 | 8 | 1.125 | 0.955 | 3.0 | 90.0 | 93.0 | 27 |
| | 1220 | 15 | 5 | 5 | 1.000 | 0.955 | 3.0 | 90.0 | 93.0 | 20 |
| | 1600 | 20 | 9 | 9 | 1.000 | 0.955 | 3.0 | 90.0 | 93.0 | 27 |
| | 1712 | 15 | 5 | 5 | 1.000 | 0.955 | 3.0 | 90.0 | 93.0 | 20 |
| | 1804 | 15 | 9 | 9 | 1.000 | 0.955 | 3.0 | 90.0 | 93.0 | 36 |
| | 1910 | 30 | 94 | 120 | 0.783 | 0.955 | 3.0 | 90.0 | 93.0 | 188 |
| | 2025 | 30 | 61 | 93 | 0.656 | 0.955 | 3.0 | 90.0 | 93.0 | 122 |
| | 2104 | 15 | 93 | 125 | 0.744 | 0.999 | 3.0 | 90.0 | 93.0 | 372 |
| | 2202 | 30 | 74 | 100 | 0.740 | 0.999 | 3.0 | 90.0 | 93.0 | 148 |
| | 2301 | 31 | 66 | 59 | 1.119 | 0.999 | 3.0 | 90.0 | 93.0 | 128 |
| 19 Sep | 2 | 30 | 59 | 67 | 0.881 | 0.999 | 3.0 | 90.0 | 93.0 | 118 |
| | 103 | 20 | 16 | 22 | 0.727 | 0.999 | 3.0 | 90.0 | 93.0 | 48 |
| | 201 | 30 | 54 | 60 | 0.900 | 0.999 | 3.0 | 90.0 | 93.0 | 108 |
| | 530 | 30 | 29 | 36 | 0.806 | 0.999 | 3.0 | 90.0 | 93.0 | 58 |
| | 635 | 20 | 53 | 94 | 0.564 | 0.999 | 3.0 | 90.0 | 93.0 | 159 |
| | 735 | 25 | 37 | 48 | 0.771 | 0.999 | 3.0 | 90.0 | 93.0 | 89 |
| | 830 | 15 | 5 | 8 | 0.625 | 0.999 | 3.0 | 90.0 | 93.0 | 20 |
| | 1235 | 20 | 12 | 12 | 1.000 | 0.999 | 3.0 | 90.0 | 93.0 | 36 |
| | 1425 | 15 | 2 | 1 | 2.000 | 0.999 | 3.0 | 90.0 | 93.0 | 8 |
| | 1732 | 15 | 6 | 10 | 0.600 | 0.999 | 3.0 | 90.0 | 93.0 | 24 |
| | 1801 | 20 | 17 | 21 | 0.810 | 0.999 | 3.0 | 90.0 | 93.0 | 51 |
| | 1910 | 30 | 50 | 63 | 0.794 | 0.999 | 3.0 | 90.0 | 93.0 | 100 |
| | 2001 | 20 | 59 | 62 | 0.952 | 0.999 | 3.0 | 90.0 | 93.0 | 177 |
| | 2139 | 20 | 44 | 40 | 1.100 | 0.999 | 3.0 | 90.0 | 93.0 | 132 |
| | 2202 | 20 | 41 | 54 | 0.759 | 0.999 | 3.0 | 90.0 | 93.0 | 123 |
| | 2303 | 31 | 66 | 77 | 0.857 | 0.999 | 3.0 | 90.0 | 93.0 | 128 |
| 20 Sep | 4 | 15 | 48 | 51 | 0.941 | 0.999 | 3.0 | 90.0 | 93.0 | 192 |
| | 101 | 15 | 54 | 104 | 0.519 | 0.999 | 3.0 | 90.0 | 93.0 | 216 |
| | 201 | 15 | 30 | 56 | 0.536 | 0.999 | 3.0 | 90.0 | 93.0 | 120 |
| | 545 | 15 | 15 | 11 | 1.364 | 0.999 | 3.0 | 90.0 | 93.0 | 60 |
| | 600 | 30 | 49 | 75 | 0.653 | 0.999 | 3.0 | 90.0 | 93.0 | 98 |
| | 715 | 30 | 62 | 96 | 0.646 | 0.999 | 3.0 | 90.0 | 93.0 | 124 |
| | 825 | 20 | 16 | 27 | 0.593 | 0.999 | 3.0 | 90.0 | 93.0 | 48 |
| | 1210 | 15 | 9 | 18 | 0.500 | 0.999 | 3.0 | 90.0 | 93.0 | 36 |
| | 1625 | 10 | 1 | 2 | 0.500 | 0.999 | 6.0 | 90.0 | 96.0 | 6 |
| | 1830 | 25 | 32 | 57 | 0.561 | 0.999 | 6.0 | 90.0 | 96.0 | 77 |
| | 1910 | 20 | 51 | 50 | 1.020 | 0.999 | 6.0 | 90.0 | 96.0 | 153 |
| | 2020 | 15 | 68 | 119 | 0.571 | 0.999 | 6.0 | 90.0 | 96.0 | 272 |
| | 2131 | 15 | 68 | 133 | 0.511 | 0.999 | 6.0 | 90.0 | 96.0 | 272 |
| | 2204 | 15 | 43 | 100 | 0.430 | 0.999 | 6.0 | 90.0 | 96.0 | 172 |
| | 2220 | 30 | 57 | 96 | 0.594 | 0.999 | 6.0 | 90.0 | 96.0 | 114 |
| | 2302 | 15 | 26 | 55 | 0.473 | 0.999 | 6.0 | 90.0 | 96.0 | 104 |
| | 2118 | 20 | 19 | 35 | 0.543 | 0.999 | 6.0 | 90.0 | 96.0 | 57 |
| 21 Sep | 32 | 21 | 18 | 31 | 0.581 | 0.999 | 6.0 | 90.0 | 96.0 | 51 |
| | 102 | 20 | 20 | 39 | 0.513 | 0.999 | 6.0 | 90.0 | 96.0 | 60 |
| | 202 | 15 | 9 | 19 | 0.474 | 0.999 | 6.0 | 90.0 | 96.0 | 36 |
| | 525 | 30 | 10 | 10 | 1.000 | 0.999 | 6.0 | 90.0 | 96.0 | 20 |
| | 630 | 30 | 38 | 90 | 0.422 | 0.999 | 6.0 | 90.0 | 96.0 | 76 |
| | 725 | 15 | 36 | 110 | 0.327 | 0.999 | 6.0 | 90.0 | 96.0 | 144 |
| | 940 | 20 | 17 | 44 | 0.386 | 0.999 | 6.0 | 90.0 | 96.0 | 51 |
| | 1401 | 15 | 2 | 2 | 1.000 | 0.999 | 2.0 | 90.0 | 92.0 | 8 |
| | 1516 | 15 | 9 | 22 | 0.409 | 0.999 | 2.0 | 90.0 | 92.0 | 36 |
| | 1820 | 20 | 7 | 5 | 1.400 | 0.999 | 2.0 | 90.0 | 92.0 | 21 |
| | 1927 | 30 | 35 | 58 | 0.603 | 0.999 | 2.0 | 90.0 | 92.0 | 70 |
| | 2000 | 20 | 52 | 117 | 0.444 | 0.999 | 2.0 | 90.0 | 92.0 | 156 |
| | 2130 | 15 | 60 | 223 | 0.269 | 0.999 | 2.0 | 90.0 | 92.0 | 240 |
| | 2203 | 15 | 78 | 316 | 0.247 | 0.999 | 2.0 | 90.0 | 92.0 | 312 |
| | 2302 | 15 | 34 | 94 | 0.362 | 0.999 | 2.0 | 90.0 | 92.0 | 136 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 Sep | 38 | 10 | 58 | 290 | 0.200 | 0.999 | 2.0 | 90.0 | 92.0 | 348 |
| | 106 | 15 | 19 | 53 | 0.358 | 0.999 | 2.0 | 90.0 | 92.0 | 76 |
| | 201 | 15 | 38 | 111 | 0.342 | 0.999 | 2.0 | 90.0 | 92.0 | 152 |
| | 548 | 12 | 4 | 16 | 0.250 | 0.999 | 2.0 | 90.0 | 92.0 | 20 |
| | 630 | 25 | 5 | 24 | 0.208 | 0.999 | 2.0 | 90.0 | 92.0 | 12 |
| | 703 | 16 | 10 | 49 | 0.204 | 0.999 | 2.0 | 90.0 | 92.0 | 38 |
| | 816 | 30 | 31 | 97 | 0.320 | 0.999 | 2.0 | 90.0 | 92.0 | 62 |
| | 1145 | 15 | 6 | 14 | 0.429 | 0.999 | 2.0 | 90.0 | 92.0 | 24 |
| | 1200 | 15 | 0 | 0 | -- | 0.999 | 2.0 | 90.0 | 92.0 | 0 |
| | 1627 | 15 | 6 | 19 | 0.316 | 0.999 | 6.0 | 90.0 | 96.0 | 24 |
| | 1803 | 20 | 17 | 27 | 0.630 | 0.999 | 6.0 | 90.0 | 96.0 | 51 |
| | 1930 | 25 | 87 | 159 | 0.547 | 0.999 | 6.0 | 90.0 | 96.0 | 209 |
| | 2000 | 15 | 57 | 113 | 0.504 | 0.999 | 6.0 | 90.0 | 96.0 | 228 |
| | 2133 | 15 | 35 | 78 | 0.449 | 0.999 | 6.0 | 90.0 | 96.0 | 140 |
| | 2201 | 20 | 49 | 96 | 0.510 | 0.999 | 6.0 | 90.0 | 96.0 | 147 |
| | 2301 | 15 | 31 | 73 | 0.425 | 0.999 | 6.0 | 90.0 | 96.0 | 124 |
| 23 Sep | 2 | 15 | 32 | 82 | 0.390 | 0.999 | 6.0 | 90.0 | 96.0 | 128 |
| | 101 | 15 | 32 | 101 | 0.317 | 0.999 | 6.0 | 90.0 | 96.0 | 128 |
| | 201 | 15 | 39 | 129 | 0.302 | 0.999 | 6.0 | 90.0 | 96.0 | 156 |
| | 615 | 30 | 46 | 133 | 0.346 | 0.999 | 6.0 | 90.0 | 96.0 | 92 |
| | 740 | 20 | 46 | 328 | 0.140 | 0.999 | 6.0 | 90.0 | 96.0 | 138 |
| | 800 | 33 | 15 | 20 | 0.750 | 0.999 | 6.0 | 90.0 | 96.0 | 27 |
| | 1240 | 20 | 12 | 12 | 1.000 | 0.999 | 6.0 | 90.0 | 96.0 | 36 |
| | 1535 | 20 | 21 | 20 | 1.050 | 0.999 | 6.0 | 90.0 | 96.0 | 63 |
| | 1827 | 20 | 13 | 21 | 0.619 | 0.999 | 6.0 | 90.0 | 96.0 | 39 |
| | 1914 | 45 | 75 | 80 | 0.938 | 0.999 | 6.0 | 90.0 | 96.0 | 100 |
| | 2000 | 30 | 36 | 45 | 0.800 | 0.999 | 6.0 | 90.0 | 96.0 | 72 |
| | 2146 | 14 | 51 | 68 | 0.750 | 0.999 | 6.0 | 90.0 | 96.0 | 219 |
| | 2220 | 15 | 77 | 117 | 0.658 | 0.999 | 6.0 | 90.0 | 96.0 | 308 |
| | 2303 | 15 | 75 | 147 | 0.510 | 0.999 | 6.0 | 90.0 | 96.0 | 300 |
| 24 Sep | 1 | 15 | 58 | 112 | 0.518 | 0.999 | 6.0 | 90.0 | 96.0 | 232 |
| | 100 | 15 | 56 | 100 | 0.560 | 0.999 | 6.0 | 90.0 | 96.0 | 224 |
| | 233 | 15 | 52 | 96 | 0.542 | 0.999 | 6.0 | 90.0 | 96.0 | 208 |
| | 330 | 15 | 44 | 64 | 0.688 | 0.999 | 6.0 | 90.0 | 96.0 | 176 |
| | 530 | 30 | 48 | 91 | 0.527 | 0.999 | 6.0 | 90.0 | 96.0 | 96 |
| | 600 | 30 | 52 | 110 | 0.473 | 0.999 | 6.0 | 90.0 | 96.0 | 104 |
| | 730 | 30 | 38 | 71 | 0.535 | 0.999 | 6.0 | 90.0 | 96.0 | 76 |
| | 800 | 30 | 42 | 88 | 0.477 | 0.999 | 6.0 | 90.0 | 96.0 | 84 |
| | 1222 | 20 | 16 | 24 | 0.667 | 0.999 | 6.0 | 90.0 | 96.0 | 48 |
| | 1500 | 30 | 26 | 37 | 0.703 | 0.999 | 6.0 | 90.0 | 96.0 | 52 |
| | 1800 | 30 | 37 | 43 | 0.860 | 0.999 | 6.0 | 90.0 | 96.0 | 74 |
| | 1900 | 25 | 64 | 80 | 0.800 | 0.999 | 6.0 | 90.0 | 96.0 | 154 |
| | 2000 | 25 | 58 | 73 | 0.795 | 0.999 | 6.0 | 90.0 | 96.0 | 139 |
| | 2100 | 15 | 56 | 85 | 0.659 | 0.999 | 6.0 | 90.0 | 96.0 | 224 |
| | 2201 | 20 | 35 | 52 | 0.673 | 0.999 | 6.0 | 90.0 | 96.0 | 105 |
| | 2301 | 15 | 72 | 132 | 0.545 | 0.999 | 6.0 | 90.0 | 96.0 | 288 |
| 25 Sep | 6 | 15 | 54 | 76 | 0.711 | 0.999 | 6.0 | 90.0 | 96.0 | 216 |
| | 101 | 20 | 51 | 55 | 0.927 | 0.999 | 6.0 | 90.0 | 96.0 | 153 |
| | 200 | 15 | 57 | 81 | 0.704 | 0.999 | 6.0 | 90.0 | 96.0 | 228 |
| | 530 | 20 | 78 | 121 | 0.645 | 0.999 | 6.0 | 90.0 | 96.0 | 234 |
| | 630 | 20 | 54 | 76 | 0.711 | 0.999 | 6.0 | 90.0 | 96.0 | 162 |
| | 730 | 20 | 51 | 133 | 0.383 | 0.999 | 6.0 | 90.0 | 96.0 | 153 |
| | 800 | 20 | 28 | 46 | 0.609 | 0.999 | 6.0 | 90.0 | 96.0 | 84 |
| | 1135 | 20 | 15 | 24 | 0.625 | 0.999 | 6.0 | 90.0 | 96.0 | 45 |
| | 1530 | 20 | 17 | 18 | 0.944 | 0.999 | 6.0 | 90.0 | 96.0 | 51 |
| | 1825 | 15 | 9 | 14 | 0.643 | 0.999 | 6.0 | 90.0 | 96.0 | 36 |
| | 1900 | 30 | 31 | 24 | 1.292 | 0.999 | 6.0 | 90.0 | 96.0 | 62 |
| | 2015 | 25 | 50 | 66 | 0.758 | 0.999 | 6.0 | 90.0 | 96.0 | 120 |
| | 2110 | 15 | 38 | 61 | 0.623 | 0.999 | 6.0 | 90.0 | 96.0 | 152 |
| | 2200 | 20 | 41 | 60 | 0.683 | 0.999 | 6.0 | 90.0 | 96.0 | 123 |
| | 2300 | 15 | 31 | 51 | 0.608 | 0.999 | 6.0 | 90.0 | 96.0 | 124 |
| Total | 500 | 9,998 | 19,335 | 24,030 | 0.805 | | | | | |

[a] The "adjustment factor" is the oscilloscope count divided by the sonar count, and was used to adjust sonar counts.

[b] Pulse repetition rate of the sonar counter at start of calibration period. When the PRR was changed, that change is reflected in the PRR shown for the start of the next calibration period.

Appendix A.8. Oscilloscope calibrations made to the 1981-model (modified) sonar counter at the Sheenjek River project site in 1990.

| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 22 Aug | 2335 | 21 | 28 | 28 | 1.000 | 0.450 | 2.0 | 108.0 | 110.0 | 80 |
| 23 Aug | 25 | 20 | 50 | 58 | 0.862 | 0.450 | 2.0 | 108.0 | 110.0 | 150 |
| | 120 | 21 | 41 | 133 | 0.308 | 0.450 | 2.0 | 108.0 | 110.0 | debris |
| | 149 | 10 | 12 | 18 | 0.667 | 0.450 | 2.0 | 108.0 | 110.0 | 72 |
| | 627 | 15 | 26 | 43 | 0.605 | 0.450 | 2.0 | 108.0 | 110.0 | 104 |
| | 648 | 10 | 18 | 45 | 0.400 | 0.550 | 2.0 | 108.0 | 110.0 | 108 |
| | 707 | 20 | 25 | 71 | 0.352 | 0.650 | 2.0 | 108.0 | 110.0 | 75 |
| | 742 | 15 | 16 | 29 | 0.552 | 0.650 | 2.0 | 108.0 | 110.0 | 64 |
| | 1535 | 20 | 0 | 0 | -- | 0.650 | 2.0 | 108.0 | 110.0 | 0 |
| | 1830 | 15 | 0 | 0 | -- | 0.650 | 2.0 | 108.0 | 110.0 | 0 |
| | 2230 | 20 | 34 | 31 | 1.097 | 0.650 | 2.0 | 108.0 | 110.0 | 102 |
| | 2301 | 20 | 10 | 3 | 3.333 | 0.650 | 2.0 | 108.0 | 110.0 | 30 |
| 24 Aug | 17 | 20 | 80 | 89 | 0.899 | 0.650 | 2.0 | 108.0 | 110.0 | 240 |
| | 720 | 20 | 21 | 26 | 0.808 | 0.650 | 2.0 | 108.0 | 110.0 | 63 |
| | 743 | 15 | 25 | 22 | 1.136 | 0.650 | 2.0 | 108.0 | 110.0 | 100 |
| | 1012 | 15 | 25 | 29 | 0.862 | 0.650 | 2.0 | 108.0 | 110.0 | 100 |
| | 2202 | 15 | 20 | 10 | 2.000 | 0.700 | 2.0 | 108.0 | 110.0 | 80 |
| | 2236 | 20 | 57 | 54 | 1.056 | 0.550 | 2.0 | 108.0 | 110.0 | 171 |
| | 2321 | 20 | 74 | 72 | 1.028 | 0.550 | 2.0 | 108.0 | 110.0 | 222 |
| 25 Aug | 27 | 20 | 17 | 15 | 1.133 | 0.550 | 2.0 | 108.0 | 110.0 | 51 |
| | 50 | 9 | 21 | 34 | 0.618 | 0.550 | 2.0 | 108.0 | 110.0 | 140 |
| | 136 | 20 | 67 | 71 | 0.944 | 0.550 | 2.0 | 108.0 | 110.0 | 201 |
| | 202 | 20 | 92 | 91 | 1.011 | 0.550 | 2.0 | 108.0 | 110.0 | 276 |
| | 618 | 20 | 15 | 13 | 1.154 | 0.550 | 2.0 | 108.0 | 110.0 | 45 |
| | 640 | 15 | 15 | 19 | 0.789 | 0.550 | 2.0 | 108.0 | 110.0 | 60 |
| | 722 | 20 | 45 | 46 | 0.978 | 0.550 | 2.0 | 108.0 | 110.0 | 135 |
| | 818 | 20 | 36 | 27 | 1.333 | 0.550 | 2.0 | 108.0 | 110.0 | 108 |
| | 2145 | 15 | 30 | 28 | 1.071 | 0.550 | 2.0 | 108.0 | 110.0 | 120 |
| | 2208 | 20 | 40 | 40 | 1.000 | 0.550 | 2.0 | 108.0 | 110.0 | 120 |
| | 2336 | 30 | 46 | 48 | 0.958 | 0.550 | 2.0 | 108.0 | 110.0 | 92 |
| 26 Aug | 601 | 20 | 35 | 46 | 0.761 | 0.550 | 2.0 | 108.0 | 110.0 | 105 |
| | 624 | 10 | 20 | 26 | 0.769 | 0.550 | 2.0 | 108.0 | 110.0 | 120 |
| | 743 | 15 | 45 | 64 | 0.703 | 0.550 | 2.0 | 108.0 | 110.0 | 180 |
| | 802 | 20 | 36 | 22 | 1.636 | 0.600 | 2.0 | 108.0 | 110.0 | 108 |
| | 936 | 20 | 31 | 38 | 0.816 | 0.550 | 2.0 | 108.0 | 110.0 | 93 |
| | 1501 | 15 | 0 | 0 | -- | 0.550 | 2.0 | 108.0 | 110.0 | 0 |
| | 2107 | 15 | 31 | 26 | 1.192 | 0.550 | 2.0 | 108.0 | 110.0 | 124 |
| | 2127 | 20 | 31 | 32 | 0.969 | 0.550 | 2.0 | 108.0 | 110.0 | 93 |
| | 2301 | 30 | 33 | 45 | 0.733 | 0.550 | 2.0 | 108.0 | 110.0 | 66 |
| 27 Aug | 1 | 15 | 22 | 36 | 0.611 | 0.550 | 2.0 | 108.0 | 110.0 | 88 |
| | 20 | 30 | 44 | 49 | 0.898 | 0.550 | 2.0 | 108.0 | 110.0 | 88 |
| | 110 | 15 | 22 | 30 | 0.733 | 0.550 | 2.0 | 108.0 | 110.0 | 88 |
| | 603 | 20 | 10 | 9 | 1.111 | 0.650 | 2.0 | 108.0 | 110.0 | 30 |
| | 740 | 20 | 5 | 4 | 1.250 | 0.650 | 2.0 | 108.0 | 110.0 | 15 |
| | 914 | 15 | 2 | 0 | -- | 0.650 | 2.0 | 108.0 | 110.0 | 8 |
| | 1554 | 10 | 2 | 1 | 2.000 | 0.650 | 2.0 | 108.0 | 110.0 | 12 |
| | 1603 | 15 | 4 | 7 | 0.571 | 0.650 | 2.0 | 108.0 | 110.0 | 16 |
| | 1815 | 20 | 1 | 3 | 0.333 | 0.650 | 2.0 | 108.0 | 110.0 | 3 |
| | 2103 | 15 | 5 | 9 | 0.556 | 0.650 | 2.0 | 108.0 | 110.0 | 20 |
| | 2310 | 15 | 9 | 6 | 1.500 | 0.650 | 2.0 | 108.0 | 110.0 | 36 |
| 28 Aug | 110 | 30 | 41 | 50 | 0.820 | 0.650 | 2.0 | 108.0 | 110.0 | 82 |
| | 540 | 20 | 43 | 44 | 0.977 | 0.650 | 2.0 | 108.0 | 110.0 | 129 |
| | 719 | 16 | 15 | 22 | 0.682 | 0.650 | 2.0 | 108.0 | 110.0 | 56 |
| | 738 | 15 | 10 | 9 | 1.111 | 0.650 | 2.0 | 108.0 | 110.0 | 40 |
| | 937 | 20 | 9 | 32 | 0.281 | 0.650 | 2.0 | 108.0 | 110.0 | 27 |
| | 1202 | 15 | 0 | 0 | -- | 0.650 | 2.0 | 108.0 | 110.0 | 0 |
| | 1815 | 15 | 8 | 5 | 1.600 | 0.650 | 2.0 | 108.0 | 110.0 | 32 |
| | 2104 | 15 | 26 | 32 | 0.813 | 0.650 | 2.0 | 108.0 | 110.0 | 104 |
| | 2132 | 22 | 43 | 35 | 1.229 | 0.650 | 2.0 | 108.0 | 110.0 | 117 |
| | 2302 | 30 | 45 | 79 | 0.570 | 0.650 | 2.0 | 108.0 | 110.0 | 90 |
| 29 Aug | 100 | 30 | 37 | 60 | 0.617 | 0.650 | 2.0 | 108.0 | 110.0 | 74 |
| | 530 | 30 | 46 | 49 | 0.939 | 0.650 | 2.0 | 108.0 | 110.0 | 92 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 721 | 20 | 8 | 5 | 1.600 | 0.650 | 2.0 | 108.0 | 110.0 | 24 |
| | 933 | 15 | 2 | 1 | 2.000 | 0.650 | 2.0 | 108.0 | 110.0 | 8 |
| | 1843 | 15 | 3 | 1 | 3.000 | 0.650 | 2.0 | 108.0 | 110.0 | 12 |
| | 2130 | 30 | 64 | 70 | 0.914 | 0.650 | 2.0 | 108.0 | 110.0 | 128 |
| | 2300 | 30 | 50 | 58 | 0.862 | 0.650 | 2.0 | 108.0 | 110.0 | 100 |
| 30 Aug | 105 | 20 | 11 | 18 | 0.611 | 0.650 | 2.0 | 108.0 | 110.0 | 33 |
| | 525 | 35 | 54 | 94 | 0.574 | 0.650 | 2.0 | 108.0 | 110.0 | 93 |
| | 604 | 15 | 18 | 21 | 0.857 | 0.750 | 2.0 | 108.0 | 110.0 | 72 |
| | 717 | 20 | 18 | 20 | 0.900 | 0.750 | 2.0 | 108.0 | 110.0 | 54 |
| | 1017 | 15 | 9 | 14 | 0.643 | 0.750 | 2.0 | 108.0 | 110.0 | 36 |
| | 1213 | 25 | 8 | 5 | 1.600 | 0.750 | 2.0 | 108.0 | 110.0 | 19 |
| | 1534 | 15 | 1 | 0 | -- | 0.750 | 2.0 | 108.0 | 110.0 | 4 |
| | 1800 | 30 | 31 | 38 | 0.816 | 0.750 | 2.0 | 108.0 | 110.0 | 62 |
| | 2145 | 30 | 38 | 42 | 0.905 | 0.750 | 2.0 | 108.0 | 110.0 | 76 |
| | 2300 | 20 | 8 | 11 | 0.727 | 0.750 | 2.0 | 108.0 | 110.0 | 24 |
| 31 Aug | 105 | 30 | 38 | 27 | 1.407 | 0.750 | 2.0 | 108.0 | 110.0 | 76 |
| | 525 | 30 | 37 | 45 | 0.822 | 0.750 | 2.0 | 108.0 | 110.0 | 74 |
| | 721 | 30 | 29 | 37 | 0.784 | 0.750 | 2.0 | 108.0 | 110.0 | 58 |
| | 1209 | 15 | 4 | 3 | 1.333 | 0.750 | 2.0 | 108.0 | 110.0 | 16 |
| | 1543 | 15 | 2 | 8 | 0.250 | 0.750 | 2.0 | 108.0 | 110.0 | 8 |
| | 1830 | 15 | 4 | 5 | 0.800 | 0.750 | 2.0 | 108.0 | 110.0 | 16 |
| | 2115 | 20 | 58 | 70 | 0.829 | 0.750 | 2.0 | 108.0 | 110.0 | 174 |
| | 2305 | 30 | 58 | 71 | 0.817 | 0.750 | 2.0 | 108.0 | 110.0 | 116 |
| 01 Sep | 115 | 30 | 67 | 64 | 1.047 | 0.750 | 2.0 | 108.0 | 110.0 | 134 |
| | 642 | 15 | 10 | 11 | 0.909 | 0.750 | 2.0 | 108.0 | 110.0 | 40 |
| | 708 | 30 | 24 | 34 | 0.706 | 0.750 | 2.0 | 108.0 | 110.0 | 48 |
| | 929 | 30 | 7 | 14 | 0.500 | 0.750 | 2.0 | 108.0 | 110.0 | 14 |
| | 1810 | 20 | 17 | 13 | 1.308 | 0.650 | 4.0 | 115.0 | 119.0 | 51 |
| | 2125 | 30 | 53 | 62 | 0.855 | 0.650 | 4.0 | 115.0 | 119.0 | 106 |
| | 2305 | 30 | 58 | 84 | 0.690 | 0.650 | 4.0 | 115.0 | 119.0 | 116 |
| 02 Sep | 125 | 30 | 42 | 45 | 0.933 | 0.650 | 4.0 | 115.0 | 119.0 | 84 |
| | 545 | 15 | 29 | 59 | 0.492 | 0.650 | 4.0 | 115.0 | 119.0 | 116 |
| | 718 | 25 | 26 | 53 | 0.491 | 0.950 | 4.0 | 115.0 | 119.0 | 62 |
| | 802 | 20 | 8 | 7 | 1.143 | 0.950 | 4.0 | 115.0 | 119.0 | 24 |
| | 921 | 20 | 8 | 28 | 0.286 | 0.950 | 4.0 | 115.0 | 119.0 | 24 |
| | 120 | 20 | 8 | 36 | 0.222 | 0.950 | 4.0 | 115.0 | 119.0 | 24 |
| | 1300 | 60 | 21 | 44 | 0.477 | 0.950 | 4.0 | 115.0 | 119.0 | |
| | 1820 | 20 | 13 | 21 | 0.619 | 0.950 | 4.0 | 115.0 | 119.0 | 39 |
| | 1916 | 20 | 27 | 42 | 0.643 | 0.950 | 4.0 | 115.0 | 119.0 | 81 |
| | 2140 | 30 | 56 | 44 | 1.273 | 0.950 | 4.0 | 115.0 | 119.0 | 112 |
| | 2305 | 25 | 50 | 52 | 0.962 | 0.950 | 4.0 | 115.0 | 119.0 | 120 |
| 03 Sep | 110 | 20 | 18 | 20 | 0.900 | 0.950 | 4.0 | 115.0 | 119.0 | 54 |
| | 530 | 28 | 54 | 86 | 0.628 | 0.950 | 4.0 | 115.0 | 119.0 | 116 |
| | 725 | 20 | 9 | 19 | 0.474 | 0.950 | 4.0 | 115.0 | 119.0 | 27 |
| | 1206 | 20 | 15 | 53 | 0.283 | 0.950 | 4.0 | 115.0 | 119.0 | 45 |
| | 1810 | 15 | 5 | 7 | 0.714 | 0.950 | 2.0 | 112.0 | 114.0 | 20 |
| | 2125 | 30 | 31 | 48 | 0.646 | 0.950 | 2.0 | 112.0 | 114.0 | 62 |
| | 2305 | 15 | 10 | 10 | 1.000 | 0.950 | 2.0 | 112.0 | 114.0 | 40 |
| 04 Sep | 105 | 30 | 36 | 50 | 0.720 | 0.950 | 2.0 | 112.0 | 114.0 | 72 |
| | 543 | 17 | 51 | 105 | 0.486 | 0.950 | 2.0 | 112.0 | 114.0 | 180 |
| | 711 | 20 | 13 | 48 | 0.271 | 0.950 | 2.0 | 112.0 | 114.0 | 39 |
| | 934 | 20 | 10 | 25 | 0.400 | 0.950 | 2.0 | 112.0 | 114.0 | 30 |
| | 1244 | 8 | 4 | 24 | 0.167 | 0.950 | 2.0 | 112.0 | 114.0 | 30 |
| | 1623 | 20 | 8 | 36 | 0.222 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 1825 | 30 | 29 | 143 | 0.203 | 0.950 | 2.0 | 112.0 | 114.0 | 58 |
| | 2034 | 20 | 18 | 20 | 0.900 | 0.950 | 2.0 | 112.0 | 114.0 | 54 |
| | 2110 | 10 | 13 | 84 | 0.155 | 0.950 | 2.0 | 112.0 | 114.0 | 78 |
| | 2300 | 30 | 28 | 34 | 0.824 | 0.950 | 2.0 | 112.0 | 114.0 | 56 |
| 05 Sep | 105 | 15 | 6 | 5 | 1.200 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 548 | 7 | 22 | 48 | 0.458 | 0.950 | 2.0 | 112.0 | 114.0 | 189 |
| | 610 | 30 | 33 | 55 | 0.600 | 0.950 | 2.0 | 112.0 | 114.0 | 66 |
| | 714 | 23 | 6 | 15 | 0.400 | 0.950 | 2.0 | 112.0 | 114.0 | 16 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1012 | 20 | 8 | 7 | 1.143 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 1218 | 15 | 9 | 9 | 1.000 | 0.950 | 2.0 | 112.0 | 114.0 | 36 |
| | 1526 | 15 | 6 | 5 | 1.200 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 1845 | 15 | 4 | 7 | 0.571 | 0.950 | 2.0 | 112.0 | 114.0 | 16 |
| | 2110 | 30 | 45 | 42 | 1.071 | 0.950 | 2.0 | 112.0 | 114.0 | 90 |
| | 2219 | 25 | 21 | 19 | 1.105 | 0.950 | 2.0 | 112.0 | 114.0 | 50 |
| | 2310 | 15 | 7 | 10 | 0.700 | 0.950 | 2.0 | 112.0 | 114.0 | 28 |
| 06 Sep | 105 | 30 | 61 | 63 | 0.968 | 0.950 | 2.0 | 112.0 | 114.0 | 122 |
| | 532 | 25 | 44 | 50 | 0.880 | 0.950 | 2.0 | 112.0 | 114.0 | 106 |
| | 703 | 30 | 29 | 26 | 1.115 | 0.950 | 2.0 | 112.0 | 114.0 | 58 |
| | 1015 | 15 | 7 | 17 | 0.412 | 0.950 | 2.0 | 112.0 | 114.0 | 28 |
| | 1832 | 20 | 8 | 10 | 0.800 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 2105 | 30 | 28 | 25 | 1.120 | 0.950 | 2.0 | 112.0 | 114.0 | 56 |
| | 2300 | 30 | 60 | 64 | 0.938 | 0.950 | 2.0 | 112.0 | 114.0 | 120 |
| 07 Sep | 100 | 15 | 8 | 6 | 1.333 | 0.950 | 2.0 | 112.0 | 114.0 | 32 |
| | 601 | 30 | 47 | 50 | 0.940 | 0.950 | 2.0 | 112.0 | 114.0 | 94 |
| | 713 | 30 | 19 | 28 | 0.679 | 0.950 | 2.0 | 112.0 | 114.0 | 38 |
| | 945 | 15 | 10 | 16 | 0.625 | 0.950 | 2.0 | 112.0 | 114.0 | 40 |
| | 1240 | 20 | 10 | 14 | 0.714 | 0.950 | 2.0 | 112.0 | 114.0 | 30 |
| | 1815 | 15 | 5 | 4 | 1.250 | 0.950 | 2.0 | 112.0 | 114.0 | 20 |
| | 2110 | 30 | 51 | 83 | 0.614 | 0.950 | 2.0 | 112.0 | 114.0 | 102 |
| | 2300 | 30 | 29 | 26 | 1.115 | 0.950 | 2.0 | 112.0 | 114.0 | 58 |
| 08 Sep | 120 | 20 | 16 | 18 | 0.889 | 0.950 | 2.0 | 112.0 | 114.0 | 48 |
| | 542 | 18 | 16 | 24 | 0.667 | 0.950 | 2.0 | 112.0 | 114.0 | 53 |
| | 608 | 20 | 52 | 74 | 0.703 | 0.950 | 2.0 | 112.0 | 114.0 | 156 |
| | 1840 | 30 | 32 | 31 | 1.032 | 0.950 | 2.0 | 112.0 | 114.0 | 64 |
| | 1931 | 20 | 5 | 10 | 0.500 | 0.950 | 2.0 | 112.0 | 114.0 | 15 |
| | 2110 | 20 | 15 | 19 | 0.789 | 0.950 | 2.0 | 112.0 | 114.0 | 45 |
| 09 Sep | 1 | 15 | 9 | 8 | 1.125 | 0.950 | 2.0 | 112.0 | 114.0 | 36 |
| | 105 | 20 | 19 | 14 | 1.357 | 0.950 | 2.0 | 112.0 | 114.0 | 57 |
| | 525 | 25 | 15 | 34 | 0.441 | 0.950 | 2.0 | 112.0 | 114.0 | 36 |
| | 635 | 20 | 27 | 99 | 0.273 | 0.950 | 2.0 | 112.0 | 114.0 | 81 |
| | 823 | 20 | 11 | 18 | 0.611 | 0.950 | 2.0 | 112.0 | 114.0 | 33 |
| [v] | 1230 | 30 | 5 | 14 | 0.131 | 0.950 | 2.0 | 112.0 | 114.0 | |
| [v] | 1300 | 60 | 33 | 22 | 1.500 | 0.950 | 2.0 | 112.0 | 114.0 | |
| [v] | 1400 | 60 | 18 | 44 | 0.409 | 0.950 | 2.0 | 112.0 | 114.0 | |
| [v] | 1515 | 30 | 2 | 36 | 0.055 | 0.950 | 2.0 | 112.0 | 114.0 | |
| | 1820 | 15 | 9 | 7 | 1.286 | 0.950 | 2.0 | 112.0 | 114.0 | 36 |
| | 2100 | 30 | 44 | 52 | 0.846 | 0.950 | 2.0 | 112.0 | 114.0 | 88 |
| | 2330 | 30 | 27 | 38 | 0.711 | 0.950 | 2.0 | 112.0 | 114.0 | 54 |
| 10 Sep | 100 | 30 | 36 | 32 | 1.125 | 0.950 | 2.0 | 112.0 | 114.0 | 72 |
| | 540 | 20 | 4 | 16 | 0.250 | 0.950 | 2.0 | 112.0 | 114.0 | 12 |
| | 604 | 30 | 23 | 59 | 0.390 | 0.950 | 2.0 | 112.0 | 114.0 | 46 |
| | 732 | 28 | 8 | 27 | 0.296 | 0.950 | 2.0 | 112.0 | 114.0 | 17 |
| [v] | 1230 | 30 | 3 | 13 | 0.230 | 0.950 | 2.0 | 112.0 | 114.0 | |
| [v] | 1330 | 30 | 0 | 15 | 0.000 | 0.950 | 2.0 | 112.0 | 114.0 | |
| | 1810 | 15 | 10 | 11 | 0.909 | 0.950 | 2.0 | 112.0 | 114.0 | 40 |
| | 2120 | 20 | 14 | 15 | 0.933 | 0.950 | 2.0 | 112.0 | 114.0 | 42 |
| 11 Sep | 5 | 35 | 37 | 60 | 0.617 | 0.950 | 2.0 | 112.0 | 114.0 | 63 |
| | 100 | 20 | 18 | 28 | 0.643 | 0.950 | 2.0 | 112.0 | 114.0 | 54 |
| | 538 | 20 | 8 | 18 | 0.444 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 705 | 20 | 20 | 26 | 0.769 | 0.950 | 2.0 | 112.0 | 114.0 | 60 |
| | 1005 | 20 | 6 | 8 | 0.750 | 0.950 | 2.0 | 112.0 | 114.0 | 18 |
| | 1405 | 30 | 62 | 136 | 0.456 | 0.950 | 2.0 | 112.0 | 114.0 | 124 |
| | 1930 | 30 | 46 | 55 | 0.836 | 0.950 | 2.0 | 112.0 | 114.0 | 92 |
| | 2120 | 15 | 47 | 46 | 1.022 | 0.950 | 2.0 | 112.0 | 114.0 | 188 |
| | 2300 | 30 | 54 | 86 | 0.628 | 0.950 | 2.0 | 112.0 | 114.0 | 108 |
| 12 Sep | 100 | 20 | 55 | 73 | 0.753 | 0.950 | 2.0 | 112.0 | 114.0 | 165 |
| | 609 | 30 | 48 | 131 | 0.366 | 0.950 | 2.0 | 112.0 | 114.0 | 96 |
| | 727 | 30 | 8 | 30 | 0.267 | 0.950 | 2.0 | 112.0 | 114.0 | 16 |
| | 930 | 30 | 41 | 40 | 1.025 | 0.950 | 2.0 | 112.0 | 114.0 | 82 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1236 | 20 | 17 | 30 | 0.567 | 0.950 | 2.0 | 112.0 | 114.0 | 51 |
| | 1545 | 15 | 15 | 30 | 0.500 | 0.950 | 2.0 | 112.0 | 114.0 | 60 |
| | 1800 | 20 | 16 | 11 | 1.455 | 0.950 | 2.0 | 112.0 | 114.0 | 48 |
| | 2100 | 30 | 38 | 89 | 0.427 | 0.950 | 2.0 | 112.0 | 114.0 | 76 |
| | 2320 | 25 | 9 | 16 | 0.563 | 0.950 | 2.0 | 112.0 | 114.0 | 22 |
| 13 Sep | 100 | 30 | 20 | 49 | 0.408 | 0.950 | 2.0 | 112.0 | 114.0 | 40 |
| | 535 | 25 | 12 | 49 | 0.245 | 0.950 | 2.0 | 112.0 | 114.0 | 29 |
| | 732 | 28 | 34 | 92 | 0.370 | 0.950 | 2.0 | 112.0 | 114.0 | 73 |
| | 920 | 20 | 18 | 54 | 0.333 | 0.950 | 2.0 | 112.0 | 114.0 | 54 |
| | 1640 | 20 | 47 | 73 | 0.644 | 0.950 | 2.0 | 112.0 | 114.0 | 141 |
| | 1900 | 15 | 3 | 2 | 1.500 | 0.950 | 2.0 | 112.0 | 114.0 | 12 |
| | 2120 | 20 | 47 | 46 | 1.022 | 0.950 | 2.0 | 112.0 | 114.0 | 141 |
| | 2300 | 15 | 8 | 6 | 1.333 | 0.950 | 2.0 | 112.0 | 114.0 | 32 |
| 14 Sep | 100 | 20 | 50 | 53 | 0.943 | 0.950 | 2.0 | 112.0 | 114.0 | 150 |
| | 539 | 20 | 32 | 51 | 0.627 | 0.950 | 2.0 | 112.0 | 114.0 | 96 |
| | 717 | 25 | 53 | 97 | 0.546 | 0.950 | 2.0 | 112.0 | 114.0 | 127 |
| | 1030 | 15 | 3 | 9 | 0.333 | 0.950 | 2.0 | 112.0 | 114.0 | 12 |
| | 1304 | 15 | 3 | 2 | 1.500 | 0.950 | 2.0 | 112.0 | 114.0 | 12 |
| | 1900 | 15 | 15 | 17 | 0.882 | 0.950 | 2.0 | 112.0 | 114.0 | 60 |
| | 2205 | 30 | 22 | 27 | 0.815 | 0.950 | 2.0 | 112.0 | 114.0 | 44 |
| 15 Sep | 5 | 20 | 15 | 29 | 0.517 | 0.950 | 2.0 | 112.0 | 114.0 | 45 |
| | 130 | 20 | 14 | 14 | 1.000 | 0.950 | 2.0 | 112.0 | 114.0 | 42 |
| | 540 | 20 | 7 | 20 | 0.350 | 0.950 | 2.0 | 112.0 | 114.0 | 21 |
| | 705 | 30 | 36 | 36 | 1.000 | 0.950 | 2.0 | 112.0 | 114.0 | 72 |
| | 933 | 27 | 31 | 50 | 0.620 | 0.950 | 2.0 | 112.0 | 114.0 | 69 |
| | 1200 | 30 | 46 | 50 | 0.920 | 0.950 | 2.0 | 112.0 | 114.0 | 92 |
| | 1536 | 15 | 5 | 6 | 0.833 | 0.950 | 2.0 | 112.0 | 114.0 | 20 |
| | 1805 | 20 | 16 | 16 | 1.000 | 0.950 | 2.0 | 112.0 | 114.0 | 48 |
| | 2130 | 20 | 86 | 53 | 1.623 | 0.950 | 2.0 | 112.0 | 114.0 | 258 |
| | 2300 | 30 | 48 | 60 | 0.800 | 0.950 | 2.0 | 112.0 | 114.0 | 96 |
| 16 Sep | 100 | 30 | 39 | 34 | 1.147 | 0.950 | 2.0 | 112.0 | 114.0 | 78 |
| | 536 | 24 | 22 | 60 | 0.367 | 0.950 | 2.0 | 112.0 | 114.0 | 55 |
| | 727 | 30 | 35 | 118 | 0.297 | 0.950 | 2.0 | 112.0 | 114.0 | 70 |
| | 930 | 30 | 50 | 91 | 0.549 | 0.950 | 2.0 | 112.0 | 114.0 | 100 |
| v | 1120 | 30 | 11 | 69 | 0.159 | 0.950 | 2.0 | 112.0 | 114.0 | |
| v | 1207 | 30 | 2 | 17 | 0.117 | 0.950 | 2.0 | 112.0 | 114.0 | |
| v | 1415 | 60 | 7 | 9 | 0.777 | 0.950 | 2.0 | 112.0 | 114.0 | |
| | 1633 | 15 | 4 | 5 | 0.800 | 0.950 | 2.0 | 112.0 | 114.0 | 16 |
| | 1800 | 15 | 6 | 4 | 1.500 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 2135 | 15 | 62 | 70 | 0.886 | 0.950 | 2.0 | 112.0 | 114.0 | 248 |
| | 2300 | 15 | 60 | 78 | 0.769 | 0.950 | 2.0 | 112.0 | 114.0 | 240 |
| 17 Sep | 100 | 15 | 61 | 82 | 0.744 | 0.950 | 2.0 | 112.0 | 114.0 | 244 |
| | 540 | 20 | 6 | 21 | 0.286 | 0.950 | 2.0 | 112.0 | 114.0 | 18 |
| | 725 | 20 | 19 | 51 | 0.373 | 0.950 | 2.0 | 112.0 | 114.0 | 57 |
| | 925 | 30 | 28 | 47 | 0.596 | 0.950 | 2.0 | 112.0 | 114.0 | 56 |
| | 1202 | 15 | 13 | 6 | 2.167 | 0.950 | 2.0 | 112.0 | 114.0 | 52 |
| | 1845 | 15 | 55 | 35 | 1.571 | 0.950 | 2.0 | 112.0 | 114.0 | 220 |
| | 2002 | 20 | 43 | 45 | 0.956 | 0.875 | 2.0 | 112.0 | 114.0 | 129 |
| | 2120 | 20 | 45 | 48 | 0.938 | 0.875 | 2.0 | 112.0 | 114.0 | 135 |
| | 2300 | 20 | 55 | 77 | 0.714 | 0.875 | 2.0 | 112.0 | 114.0 | 165 |
| 18 Sep | 100 | 25 | 50 | 83 | 0.602 | 0.875 | 2.0 | 112.0 | 114.0 | 120 |
| | 608 | 15 | 6 | 14 | 0.429 | 0.950 | 2.0 | 112.0 | 114.0 | 24 |
| | 624 | 15 | 43 | 114 | 0.377 | 0.950 | 2.0 | 112.0 | 114.0 | 172 |
| | 712 | 30 | 37 | 47 | 0.787 | 0.950 | 2.0 | 112.0 | 114.0 | 74 |
| | 930 | 27 | 51 | 71 | 0.718 | 0.950 | 2.0 | 112.0 | 114.0 | 113 |
| v | 1330 | 30 | 31 | 207 | 0.149 | 0.950 | 2.0 | 112.0 | 114.0 | |
| | 1920 | 30 | 44 | 47 | 0.936 | 0.950 | 2.0 | 112.0 | 114.0 | 88 |
| | 2136 | 24 | 48 | 46 | 1.043 | 0.950 | 2.0 | 112.0 | 114.0 | 120 |
| | 2300 | 30 | 20 | 14 | 1.429 | 0.950 | 2.0 | 112.0 | 114.0 | 40 |
| 19 Sep | 100 | 15 | 1 | 0 | -- | 0.950 | 2.0 | 112.0 | 114.0 | 4 |
| | 603 | 30 | 27 | 35 | 0.771 | 0.950 | 2.0 | 112.0 | 114.0 | 54 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 718 | 30 | 46 | 59 | 0.780 | 0.950 | 2.0 | 112.0 | 114.0 | 92 |
| | 923 | 30 | 27 | 66 | 0.409 | 0.950 | 2.0 | 112.0 | 114.0 | 54 |
| | 1423 | 20 | 24 | 18 | 1.333 | 0.950 | 2.0 | 112.0 | 114.0 | 72 |
| | 1830 | 30 | 42 | 23 | 1.826 | 0.950 | 2.0 | 112.0 | 114.0 | 84 |
| | 1946 | 14 | 18 | 20 | 0.900 | 0.950 | 2.0 | 112.0 | 114.0 | 77 |
| | 2115 | 20 | 53 | 111 | 0.477 | 0.900 | 2.0 | 112.0 | 114.0 | 159 |
| | 2300 | 20 | 56 | 78 | 0.718 | 0.900 | 2.0 | 112.0 | 114.0 | 168 |
| 20 Sep | 100 | 15 | 58 | 60 | 0.967 | 0.900 | 2.0 | 112.0 | 114.0 | 232 |
| | 535 | 25 | 38 | 52 | 0.731 | 0.900 | 2.0 | 112.0 | 114.0 | 91 |
| | 715 | 30 | 35 | 41 | 0.854 | 0.900 | 2.0 | 112.0 | 114.0 | 70 |
| | 936 | 24 | 60 | 90 | 0.667 | 0.900 | 2.0 | 112.0 | 114.0 | 150 |
| | 1211 | 15 | 5 | 10 | 0.500 | 0.900 | 2.0 | 112.0 | 114.0 | 20 |
| | 1615 | 20 | 12 | 11 | 1.091 | 0.900 | 2.0 | 112.0 | 114.0 | 36 |
| | 2011 | 30 | 61 | 56 | 1.089 | 0.900 | 2.0 | 112.0 | 114.0 | 122 |
| | 2200 | 20 | 50 | 57 | 0.877 | 0.900 | 2.0 | 112.0 | 114.0 | 150 |
| 21 Sep | 1 | 25 | 57 | 60 | 0.950 | 0.900 | 2.0 | 112.0 | 114.0 | 137 |
| | 125 | 15 | 69 | 75 | 0.920 | 0.900 | 2.0 | 112.0 | 114.0 | 276 |
| | 535 | 10 | 15 | 11 | 1.364 | 0.900 | 2.0 | 112.0 | 114.0 | 90 |
| | 545 | 15 | 17 | 15 | 1.133 | 0.830 | 2.0 | 112.0 | 114.0 | 68 |
| | 718 | 20 | 11 | 12 | 0.917 | 0.830 | 2.0 | 112.0 | 114.0 | 33 |
| | 925 | 13 | 29 | 11 | 2.636 | 0.830 | 2.0 | 112.0 | 114.0 | 134 |
| | 938 | 15 | 30 | 32 | 0.938 | 0.720 | 2.0 | 112.0 | 114.0 | 120 |
| | 1437 | 20 | 14 | 24 | 0.583 | 0.720 | 2.0 | 112.0 | 114.0 | 42 |
| | 1805 | 15 | 10 | 15 | 0.667 | 0.720 | 2.0 | 112.0 | 114.0 | 40 |
| | 2136 | 20 | 69 | 79 | 0.873 | 0.720 | 2.0 | 112.0 | 114.0 | 207 |
| | 2320 | 20 | 58 | 91 | 0.637 | 0.720 | 2.0 | 112.0 | 114.0 | 174 |
| 22 Sep | 100 | 20 | 50 | 63 | 0.794 | 0.720 | 2.0 | 112.0 | 114.0 | 150 |
| | 538 | 5 | 18 | 62 | 0.290 | 0.720 | 2.0 | 112.0 | 114.0 | 216 |
| | 543 | 17 | 52 | 82 | 0.634 | 0.840 | 2.0 | 112.0 | 114.0 | 184 |
| | 605 | 20 | 66 | 96 | 0.688 | 0.850 | 2.0 | 112.0 | 114.0 | 198 |
| | 720 | 20 | 48 | 57 | 0.842 | 0.850 | 2.0 | 112.0 | 114.0 | 144 |
| | 925 | 20 | 36 | 43 | 0.837 | 0.850 | 2.0 | 112.0 | 114.0 | 108 |
| | 1345 | 15 | 9 | 5 | 1.800 | 0.850 | 2.0 | 112.0 | 114.0 | 36 |
| | 1810 | 20 | 16 | 14 | 1.143 | 0.850 | 2.0 | 112.0 | 114.0 | 48 |
| | 2030 | 10 | 35 | 23 | 1.522 | 0.850 | 2.0 | 112.0 | 114.0 | 210 |
| | 2040 | 20 | 23 | 20 | 1.150 | 0.750 | 2.0 | 112.0 | 114.0 | 69 |
| | 2115 | 30 | 57 | 67 | 0.851 | 0.750 | 2.0 | 112.0 | 114.0 | 114 |
| | 2330 | 30 | 60 | 77 | 0.779 | 0.750 | 2.0 | 112.0 | 114.0 | 120 |
| 23 Sep | 100 | 30 | 45 | 75 | 0.600 | 0.750 | 2.0 | 112.0 | 114.0 | 90 |
| | 531 | 20 | 53 | 65 | 0.815 | 0.750 | 2.0 | 112.0 | 114.0 | 159 |
| | 725 | 30 | 56 | 65 | 0.862 | 0.780 | 2.0 | 112.0 | 114.0 | 112 |
| | 935 | 20 | 20 | 19 | 1.053 | 0.780 | 2.0 | 112.0 | 114.0 | 60 |
| | 1403 | 20 | 18 | 33 | 0.545 | 0.780 | 2.0 | 112.0 | 114.0 | 54 |
| | 1910 | 15 | 6 | 6 | 1.000 | 0.780 | 2.0 | 112.0 | 114.0 | 24 |
| | 2035 | 20 | 32 | 28 | 1.143 | 0.780 | 2.0 | 112.0 | 114.0 | 96 |
| | 2110 | 30 | 38 | 36 | 1.056 | 0.780 | 2.0 | 112.0 | 114.0 | 76 |
| | 2310 | 30 | 60 | 88 | 0.682 | 0.780 | 2.0 | 112.0 | 114.0 | 120 |
| 24 Sep | 100 | 15 | 47 | 44 | 1.068 | 0.780 | 2.0 | 112.0 | 114.0 | 188 |
| | 535 | 25 | 45 | 68 | 0.662 | 0.780 | 2.0 | 112.0 | 114.0 | 108 |
| | 710 | 30 | 62 | 99 | 0.626 | 0.950 | 2.0 | 112.0 | 114.0 | 124 |
| | 935 | 25 | 34 | 46 | 0.739 | 0.950 | 2.0 | 112.0 | 114.0 | 82 |
| | 1417 | 15 | 10 | 11 | 0.909 | 0.950 | 2.0 | 112.0 | 114.0 | 40 |
| | 1820 | 30 | 43 | 60 | 0.717 | 0.950 | 2.0 | 112.0 | 114.0 | 86 |
| | 2040 | 20 | 28 | 22 | 1.273 | 0.950 | 2.0 | 112.0 | 114.0 | 84 |
| | 2105 | 30 | 31 | 26 | 1.192 | 0.950 | 2.0 | 112.0 | 114.0 | 62 |
| | 2300 | 30 | 54 | 66 | 0.818 | 0.870 | 2.0 | 112.0 | 114.0 | 108 |
| 25 Sep | 125 | 25 | 50 | 64 | 0.781 | 0.870 | 2.0 | 112.0 | 114.0 | 120 |
| | 530 | 30 | 34 | 40 | 0.850 | 0.870 | 2.0 | 112.0 | 114.0 | 68 |
| | 722 | 15 | 37 | 44 | 0.841 | 0.870 | 2.0 | 112.0 | 114.0 | 148 |
| | 740 | 15 | 18 | 27 | 0.667 | 0.900 | 2.0 | 112.0 | 114.0 | 72 |
| | 800 | 10 | 20 | 37 | 0.541 | 0.950 | 2.0 | 112.0 | 114.0 | 120 |
| | 1130 | 30 | 42 | 60 | 0.700 | 0.950 | 2.0 | 112.0 | 114.0 | 84 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1622 | 20 | 20 | 58 | 0.345 | 0.950 | 2.0 | 112.0 | 114.0 | 60 |
| | 1925 | 10 | 12 | 6 | 2.000 | 0.950 | 2.0 | 112.0 | 114.0 | 72 |
| | 1935 | 20 | 25 | 29 | 0.862 | 0.900 | 2.0 | 112.0 | 114.0 | 75 |
| | 2100 | 25 | 50 | 91 | 0.549 | 0.900 | 2.0 | 112.0 | 114.0 | 120 |
| | 2130 | 15 | 23 | 24 | 0.958 | 0.900 | 2.0 | 112.0 | 114.0 | 92 |
| | 2145 | 10 | 24 | 29 | 0.828 | 0.900 | 2.0 | 112.0 | 114.0 | 144 |
| | 2310 | 30 | 62 | 78 | 0.795 | 0.900 | 2.0 | 112.0 | 114.0 | 124 |
| 26 Sep | 105 | 30 | 48 | 75 | 0.640 | 0.900 | 2.0 | 112.0 | 114.0 | 96 |
| | 520 | 30 | 21 | 64 | 0.328 | 0.900 | 2.0 | 112.0 | 114.0 | 42 |
| | 707 | 15 | 32 | 66 | 0.485 | 0.900 | 2.0 | 112.0 | 114.0 | 128 |
| | 730 | 15 | 26 | 50 | 0.520 | 0.950 | 2.0 | 112.0 | 114.0 | 104 |
| | 1020 | 20 | 10 | 14 | 0.714 | 0.950 | 2.0 | 112.0 | 114.0 | 30 |
| | 1340 | 15 | 8 | 8 | 1.000 | 0.950 | 2.0 | 112.0 | 114.0 | 32 |
| | 1636 | 20 | 12 | 16 | 0.750 | 0.950 | 2.0 | 112.0 | 114.0 | 36 |
| | 1830 | 15 | 16 | 10 | 1.600 | 0.950 | 2.0 | 112.0 | 114.0 | 64 |
| | 2120 | 30 | 43 | 56 | 0.768 | 0.950 | 2.0 | 112.0 | 114.0 | 86 |
| | 2305 | 30 | 68 | 72 | 0.944 | 0.950 | 2.0 | 112.0 | 114.0 | 136 |
| 27 Sep | 100 | 15 | 49 | 70 | 0.700 | 0.950 | 2.0 | 112.0 | 114.0 | 196 |
| | 529 | 25 | 57 | 223 | 0.256 | 0.950 | 2.0 | 112.0 | 114.0 | 137 |
| | 721 | 20 | 60 | 306 | 0.196 | 0.950 | 2.0 | 112.0 | 114.0 | 180 |
| | 1011 | 20 | 20 | 56 | 0.357 | 0.950 | 2.0 | 112.0 | 114.0 | 60 |
| | 1435 | 20 | 17 | 22 | 0.773 | 0.950 | 2.0 | 112.0 | 114.0 | 51 |
| | 1835 | 25 | 33 | 42 | 0.786 | 0.950 | 2.0 | 112.0 | 114.0 | 79 |
| | 2125 | 20 | 18 | 23 | 0.783 | 0.950 | 2.0 | 112.0 | 114.0 | 54 |
| | 2310 | 30 | 36 | 52 | 0.692 | 0.950 | 2.0 | 112.0 | 114.0 | 72 |
| 28 Sep | 110 | 30 | 42 | 75 | 0.560 | 0.950 | 2.0 | 112.0 | 114.0 | 84 |
| | 535 | 25 | 30 | 80 | 0.375 | 0.950 | 2.0 | 112.0 | 114.0 | 72 |
| | 728 | 30 | 35 | 88 | 0.398 | 0.950 | 2.0 | 112.0 | 114.0 | 70 |
| | 1126 | 15 | 5 | 6 | 0.833 | 0.950 | 2.0 | 112.0 | 114.0 | 20 |
| Total | 326 | 6,976 | 9,445 | 13,439 | 0.703 | | | | | |

[a] The "adjustment factor" is the oscilloscope count divided by the sonar count, and was used to adjust sonar counts.

[b] Pulse repetition rate of the sonar counter at start of calibration period. When the PRR was changed, that change is reflected in the PRR shown for the start of the next calibration period.

[c] Visual calibration.

Appendix A.9. Oscilloscope calibrations made to the 1977-model sonar counter at the Sheenjek River project site in 1991.

| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 Aug | 2310 | 20 | 7 | 8 | 0.875 | 0.400 | 1.5 | 90.0 | 91.5 | 21 |
| 11 Aug | 43 | 15 | 17 | 9 | 1.889 | 0.400 | 1.5 | 90.0 | 91.5 | 68 |
| | 2140 | 15 | 0 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 0 |
| | 2345 | 15 | 3 | 1 | 3.000 | 0.400 | 1.5 | 90.0 | 91.5 | 12 |
| 12 Aug | 605 | 15 | 1 | 1 | 1.000 | 0.400 | 1.5 | 90.0 | 91.5 | 4 |
| | 915 | 15 | 2 | 1 | 2.000 | 0.400 | 1.5 | 90.0 | 91.5 | 8 |
| | 1250 | 10 | 0 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 0 |
| | 1610 | 15 | 1 | 2 | 0.500 | 0.400 | 1.5 | 90.0 | 91.5 | 4 |
| | 2030 | 15 | 0 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 0 |
| | 2202 | 20 | 16 | 24 | 0.667 | 0.400 | 1.5 | 90.0 | 91.5 | 48 |
| 13 Aug | 10 | 15 | 3 | 2 | 1.500 | 0.400 | 1.5 | 90.0 | 91.5 | 12 |
| | 205 | 15 | 4 | 1 | 4.000 | 0.400 | 1.5 | 90.0 | 91.5 | 16 |
| | 515 | 15 | 0 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 0 |
| | 915 | 15 | 0 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 0 |
| | 1228 | 15 | 2 | 1 | 2.000 | 0.400 | 1.5 | 90.0 | 91.5 | 8 |
| | 1534 | 15 | 0 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 0 |
| | 2005 | 15 | 5 | 4 | 1.250 | 0.400 | 1.5 | 90.0 | 91.5 | 20 |
| | 2215 | 15 | 2 | 2 | 1.000 | 0.400 | 1.5 | 90.0 | 91.5 | 8 |
| 14 Aug | 10 | 15 | 1 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 4 |
| | 210 | 15 | 2 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 8 |
| | 533 | 15 | 1 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 4 |
| | 920 | 20 | 0 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 0 |
| | 1510 | 15 | 1 | 1 | 1.000 | 0.400 | 1.5 | 90.0 | 91.5 | 4 |
| | 2105 | 20 | 14 | 11 | 1.273 | 0.400 | 1.5 | 90.0 | 91.5 | 42 |
| | 2320 | 15 | 7 | 3 | 2.333 | 0.400 | 1.5 | 90.0 | 91.5 | 28 |
| 15 Aug | 5 | 15 | 4 | 0 | -- | 0.400 | 1.5 | 90.0 | 91.5 | 16 |
| | 201 | 15 | 6 | 5 | 1.200 | 0.400 | 1.5 | 90.0 | 91.5 | 24 |
| | 530 | 15 | 8 | 12 | 0.667 | 0.400 | 1.5 | 90.0 | 91.5 | 32 |
| | 550 | 10 | 2 | 2 | 1.000 | 0.350 | 1.5 | 90.0 | 91.5 | 12 |
| | 720 | 15 | 4 | 0 | -- | 0.350 | 1.5 | 90.0 | 91.5 | 16 |
| | 945 | 15 | 10 | 9 | 1.111 | 0.350 | 1.5 | 90.0 | 91.5 | 40 |
| | 2010 | 15 | 0 | 1 | 0.000 | 0.350 | 1.5 | 90.0 | 91.5 | 0 |
| | 2200 | 15 | 7 | 4 | 1.750 | 0.350 | 1.5 | 90.0 | 91.5 | 28 |
| | 2330 | 15 | 3 | 1 | 3.000 | 0.350 | 1.5 | 90.0 | 91.5 | 12 |
| 16 Aug | 110 | 48 | 20 | 15 | 1.333 | 0.350 | 1.5 | 90.0 | 91.5 | 25 |
| | 830 | 15 | 6 | 5 | 1.200 | 0.300 | 1.5 | 90.0 | 91.5 | 24 |
| | 622 | 15 | 3 | 2 | 1.500 | 0.300 | 1.5 | 90.0 | 91.5 | 12 |
| | 1238 | 15 | 2 | 3 | 0.667 | 0.300 | 1.5 | 90.0 | 91.5 | 8 |
| | 1842 | 15 | 3 | 1 | 3.000 | 0.300 | 1.5 | 90.0 | 91.5 | 12 |
| | 2036 | 15 | 1 | 2 | 0.500 | 0.300 | 1.5 | 90.0 | 91.5 | 4 |
| | 2230 | 25 | 10 | 15 | 0.667 | 0.300 | 1.5 | 90.0 | 91.5 | 24 |
| | 2335 | 22 | 25 | 24 | 1.042 | 0.300 | 1.5 | 90.0 | 91.5 | 68 |
| 17 Aug | 30 | 20 | 15 | 20 | 0.750 | 0.300 | 1.5 | 90.0 | 91.5 | 45 |
| | 200 | 15 | 8 | 7 | 1.143 | 0.300 | 1.5 | 90.0 | 91.5 | 32 |
| | 510 | 15 | 4 | 2 | 2.000 | 0.300 | 1.5 | 90.0 | 91.5 | 16 |
| | 615 | 15 | 2 | 0 | -- | 0.300 | 1.5 | 90.0 | 91.5 | 8 |
| | 700 | 15 | 6 | 8 | 0.750 | 0.300 | 1.5 | 90.0 | 91.5 | 24 |
| | 1001 | 15 | 0 | 0 | -- | 0.300 | 1.5 | 90.0 | 91.5 | 0 |
| | 1205 | 15 | 3 | 4 | 0.750 | 0.300 | 1.5 | 90.0 | 91.5 | 12 |
| | 1612 | 15 | 1 | 3 | 0.333 | 0.300 | 1.5 | 90.0 | 91.5 | 4 |
| | 1845 | 15 | 0 | 0 | -- | 0.300 | 1.5 | 90.0 | 91.5 | 0 |
| | 2045 | 15 | 2 | 0 | -- | 0.300 | 1.5 | 90.0 | 91.5 | 8 |
| | 2230 | 15 | 3 | 1 | 3.000 | 0.300 | 1.5 | 90.0 | 91.5 | 12 |
| | 2330 | 25 | 22 | 20 | 1.100 | 0.300 | 1.5 | 90.0 | 91.5 | 53 |
| 18 Aug | 37 | 15 | 3 | 3 | 1.000 | 0.300 | 1.5 | 90.0 | 91.5 | 12 |
| | 200 | 30 | 24 | 23 | 1.043 | 0.300 | 1.5 | 90.0 | 91.5 | 48 |
| | 522 | 15 | 3 | 1 | 3.000 | 0.300 | 1.5 | 90.0 | 91.5 | 12 |
| | 612 | 30 | 20 | 51 | 0.392 | 0.300 | 1.5 | 90.0 | 91.5 | 40 |
| | 710 | 30 | 41 | 91 | 0.451 | 0.300 | 1.5 | 90.0 | 91.5 | 82 |
| | 1310 | 15 | 2 | 1 | 2.000 | 0.300 | 1.5 | 90.0 | 91.5 | 8 |
| | 2124 | 15 | 7 | 15 | 0.467 | 0.300 | 1.5 | 90.0 | 91.5 | 28 |
| | 2207 | 10 | 20 | 75 | 0.267 | 0.300 | 1.5 | 90.0 | 91.5 | 120 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2221 | 15 | 7 | 9 | 0.778 | 0.400 | 1.5 | 90.0 | 91.5 | 28 |
| | 2310 | 20 | 34 | 49 | 0.694 | 0.400 | 1.5 | 90.0 | 91.5 | 102 |
| | 2335 | 10 | 2 | 2 | 1.000 | 0.450 | 1.5 | 90.0 | 91.5 | 12 |
| 19 Aug | 11 | 25 | 5 | 1 | 5.000 | 0.450 | 1.5 | 90.0 | 91.5 | 12 |
| | 200 | 20 | 17 | 24 | 0.708 | 0.450 | 1.5 | 90.0 | 91.5 | 51 |
| | 520 | 15 | 4 | 8 | 0.500 | 0.450 | 1.5 | 90.0 | 91.5 | 16 |
| | 620 | 20 | 12 | 30 | 0.400 | 0.450 | 1.5 | 90.0 | 91.5 | 36 |
| | 725 | 20 | 14 | 63 | 0.222 | 0.450 | 1.5 | 90.0 | 91.5 | 42 |
| | 1005 | 30 | 40 | 478 | 0.084 | 0.450 | 1.5 | 90.0 | 91.5 | 80 |
| | 1318 | 10 | 1 | 4 | 0.250 | 0.500 | 1.5 | 90.0 | 91.5 | 6 |
| | 1700 | 15 | 3 | 1 | 3.000 | 0.500 | 1.5 | 90.0 | 91.5 | 12 |
| | 2120 | 15 | 38 | 77 | 0.494 | 0.500 | 1.5 | 90.0 | 91.5 | 152 |
| | 2212 | 10 | 17 | 36 | 0.472 | 0.600 | 1.5 | 90.0 | 91.5 | 102 |
| | 2225 | 10 | 13 | 12 | 1.083 | 0.700 | 1.5 | 90.0 | 91.5 | 78 |
| | 2306 | 15 | 11 | 6 | 1.833 | 0.700 | 1.5 | 90.0 | 91.5 | 44 |
| | 2628 | 15 | 21 | 20 | 1.050 | 0.640 | 1.5 | 90.0 | 91.5 | 84 |
| 20 Aug | 34 | 15 | 8 | 5 | 1.600 | 0.640 | 1.5 | 90.0 | 91.5 | 32 |
| | 208 | 25 | 9 | 5 | 1.800 | 0.640 | 1.5 | 90.0 | 91.5 | 22 |
| | 505 | 15 | 5 | 4 | 1.250 | 0.640 | 1.5 | 90.0 | 91.5 | 20 |
| | 610 | 15 | 3 | 2 | 1.500 | 0.640 | 1.5 | 90.0 | 91.5 | 12 |
| | 702 | 15 | 1 | 1 | 1.000 | 0.640 | 1.5 | 90.0 | 91.5 | 4 |
| | 1005 | 30 | 3 | 11 | 0.272 | 0.640 | 1.5 | 90.0 | 91.5 | |
| | 1302 | 15 | 0 | 0 | -- | 0.640 | 1.5 | 90.0 | 91.5 | 0 |
| | 1635 | 15 | 0 | 0 | -- | 0.640 | 1.5 | 90.0 | 91.5 | 0 |
| | 2030 | 15 | 1 | 0 | -- | 0.640 | 1.5 | 90.0 | 91.5 | 4 |
| | 2210 | 25 | 25 | 29 | 0.862 | 0.640 | 1.5 | 90.0 | 91.5 | 60 |
| | 2330 | 25 | 20 | 10 | 2.000 | 0.640 | 1.5 | 90.0 | 91.5 | 48 |
| 21 Aug | 30 | 15 | 9 | 32 | 0.281 | 0.640 | 1.5 | 90.0 | 91.5 | 36 |
| | 205 | 15 | 29 | 19 | 1.526 | 0.640 | 1.5 | 90.0 | 91.5 | 116 |
| | 505 | 15 | 5 | 3 | 1.667 | 0.600 | 1.5 | 90.0 | 91.5 | 20 |
| | 630 | 20 | 17 | 35 | 0.486 | 0.600 | 1.5 | 90.0 | 91.5 | 51 |
| | 720 | 15 | 9 | 7 | 1.286 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 1003 | 15 | 2 | 12 | 0.167 | 0.600 | 1.5 | 90.0 | 91.5 | 8 |
| | 1203 | 15 | 9 | 33 | 0.273 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 2015 | 15 | 2 | 4 | 0.500 | 0.600 | 1.5 | 90.0 | 91.5 | 8 |
| | 2220 | 25 | 31 | 44 | 0.705 | 0.600 | 1.5 | 90.0 | 91.5 | 74 |
| | 2340 | 20 | 28 | 30 | 0.933 | 0.600 | 1.5 | 90.0 | 91.5 | 84 |
| 22 Aug | 35 | 25 | 38 | 30 | 1.267 | 0.600 | 1.5 | 90.0 | 91.5 | 91 |
| | 210 | 10 | 27 | 35 | 0.771 | 0.600 | 1.5 | 90.0 | 91.5 | 162 |
| | 515 | 30 | 26 | 32 | 0.813 | 0.600 | 1.5 | 90.0 | 91.5 | 52 |
| | 601 | 20 | 15 | 21 | 0.714 | 0.600 | 1.5 | 90.0 | 91.5 | 45 |
| | 715 | 15 | 5 | 6 | 0.833 | 0.600 | 1.5 | 90.0 | 91.5 | 20 |
| | 1020 | 15 | 9 | 12 | 0.750 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 1515 | 10 | 0 | 0 | -- | 0.600 | 1.5 | 90.0 | 91.5 | 0 |
| | 1905 | 30 | 28 | 18 | 1.556 | 0.600 | 1.5 | 90.0 | 91.5 | 56 |
| | 2135 | 22 | 21 | 10 | 2.100 | 0.600 | 1.5 | 90.0 | 91.5 | 57 |
| | 2210 | 39 | 111 | 91 | 1.220 | 0.550 | 1.5 | 90.0 | 91.5 | 171 |
| | 2330 | 20 | 92 | 92 | 1.000 | 0.550 | 1.5 | 90.0 | 91.5 | 276 |
| 23 Aug | 42 | 15 | 20 | 37 | 0.541 | 0.550 | 1.5 | 90.0 | 91.5 | 80 |
| | 125 | 15 | 21 | 13 | 1.615 | 0.550 | 1.5 | 90.0 | 91.5 | 84 |
| | 200 | 15 | 8 | 8 | 1.000 | 0.550 | 1.5 | 90.0 | 91.5 | 32 |
| | 500 | 30 | 79 | 162 | 0.488 | 0.550 | 1.5 | 90.0 | 91.5 | 158 |
| | 620 | 30 | 37 | 68 | 0.544 | 0.550 | 1.5 | 90.0 | 91.5 | 74 |
| | 715 | 15 | 7 | 7 | 1.000 | 0.550 | 1.5 | 90.0 | 91.5 | 28 |
| | 1015 | 15 | 11 | 29 | 0.379 | 0.550 | 1.5 | 90.0 | 91.5 | 44 |
| | 1600 | 15 | 9 | 12 | 0.750 | 0.550 | 1.5 | 90.0 | 91.5 | 36 |
| | 1908 | 15 | 12 | 19 | 0.632 | 0.550 | 1.5 | 90.0 | 91.5 | 48 |
| | 2237 | 20 | 34 | 31 | 1.097 | 0.550 | 1.5 | 90.0 | 91.5 | 102 |
| | 2325 | 30 | 26 | 36 | 0.722 | 0.550 | 1.5 | 90.0 | 91.5 | 52 |
| 24 Aug | 30 | 20 | 18 | 16 | 1.125 | 0.550 | 1.5 | 90.0 | 91.5 | 54 |
| | 124 | 20 | 20 | 20 | 1.000 | 0.550 | 1.5 | 90.0 | 91.5 | 60 |
| | 215 | 15 | 8 | 16 | 0.500 | 0.550 | 1.5 | 90.0 | 91.5 | 32 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 530 | 15 | 7 | 25 | 0.280 | 0.550 | 1.5 | 90.0 | 91.5 | 28 |
| | 615 | 30 | 22 | 85 | 0.259 | 0.550 | 1.5 | 90.0 | 91.5 | 44 |
| | 715 | 30 | 20 | 65 | 0.308 | 0.550 | 1.5 | 90.0 | 91.5 | 40 |
| | 1040 | 15 | 4 | 36 | 0.111 | 0.550 | 1.5 | 90.0 | 91.5 | 16 |
| | 1105 | 45 | 35 | 215 | 0.163 | 0.550 | 1.5 | 90.0 | 91.5 | 47 |
| | 1820 | 15 | 10 | 8 | 1.250 | 0.550 | 1.5 | 90.0 | 91.5 | 40 |
| | 2212 | 20 | 59 | 188 | 0.314 | 0.550 | 1.5 | 90.0 | 91.5 | 177 |
| | 2320 | 39 | 49 | 58 | 0.845 | 0.550 | 1.5 | 90.0 | 91.5 | 75 |
| 25 Aug | 107 | 20 | 20 | 30 | 0.667 | 0.550 | 1.5 | 90.0 | 91.5 | 60 |
| | 240 | 20 | 31 | 44 | 0.705 | 0.550 | 1.5 | 90.0 | 91.5 | 93 |
| | 555 | 20 | 18 | 37 | 0.486 | 0.550 | 1.5 | 90.0 | 91.5 | 54 |
| | 630 | 15 | 5 | 19 | 0.263 | 0.550 | 1.5 | 90.0 | 91.5 | 20 |
| | 720 | 30 | 29 | 41 | 0.707 | 0.550 | 1.5 | 90.0 | 91.5 | 58 |
| | 1105 | 15 | 2 | 1 | 2.000 | 0.550 | 1.5 | 90.0 | 91.5 | 8 |
| | 1300 | 15 | 1 | 0 | -- | 0.550 | 1.5 | 90.0 | 91.5 | 4 |
| | 1600 | 15 | 7 | 14 | 0.500 | 0.550 | 1.5 | 90.0 | 91.5 | 28 |
| | 1940 | 15 | 13 | 45 | 0.289 | 0.550 | 1.5 | 90.0 | 91.5 | 52 |
| | 2120 | 20 | 14 | 14 | 1.000 | 0.550 | 1.5 | 90.0 | 91.5 | 42 |
| | 2206 | 20 | 13 | 12 | 1.083 | 0.550 | 1.5 | 90.0 | 91.5 | 39 |
| | 2311 | 20 | 13 | 11 | 1.182 | 0.550 | 1.5 | 90.0 | 91.5 | 39 |
| 26 Aug | 3 | 20 | 13 | 10 | 1.300 | 0.550 | 1.5 | 90.0 | 91.5 | 39 |
| | 27 | 15 | 11 | 5 | 2.200 | 0.550 | 1.5 | 90.0 | 91.5 | 44 |
| | 200 | 20 | 16 | 14 | 1.143 | 0.550 | 1.5 | 90.0 | 91.5 | 48 |
| | 525 | 30 | 56 | 136 | 0.412 | 0.550 | 1.5 | 90.0 | 91.5 | 112 |
| | 610 | 30 | 44 | 126 | 0.349 | 0.550 | 1.5 | 90.0 | 91.5 | 88 |
| | 745 | 30 | 44 | 154 | 0.286 | 0.550 | 1.5 | 90.0 | 91.5 | 88 |
| | 1010 | 15 | 25 | 144 | 0.174 | 0.550 | 1.5 | 90.0 | 91.5 | 100 |
| | 1137 | 15 | 15 | 75 | 0.200 | 0.550 | 1.5 | 90.0 | 91.5 | 60 |
| | 1205 | 15 | 27 | 148 | 0.182 | 0.550 | 1.5 | 90.0 | 91.5 | 108 |
| | 1413 | 11 | 0 | 0 | ERR | 0.550 | 1.5 | 90.0 | 91.5 | 0 |
| | 1620 | 15 | 8 | 5 | 1.600 | 0.550 | 1.5 | 90.0 | 91.5 | 32 |
| | 2005 | 20 | 19 | 85 | 0.224 | 0.550 | 1.5 | 90.0 | 91.5 | 57 |
| | 2140 | 20 | 12 | 74 | 0.162 | 0.550 | 1.5 | 90.0 | 91.5 | 36 |
| | 2240 | 20 | 24 | 39 | 0.615 | 0.550 | 1.5 | 90.0 | 91.5 | 72 |
| | 2325 | 20 | 30 | 83 | 0.361 | 0.550 | 1.5 | 90.0 | 91.5 | 90 |
| 27 Aug | 40 | 20 | 19 | 237 | 0.080 | 0.550 | 1.5 | 90.0 | 91.5 | 57 |
| | 210 | 20 | 13 | 52 | 0.250 | 0.550 | 1.5 | 90.0 | 91.5 | 39 |
| | 550 | 30 | 49 | 89 | 0.551 | 0.550 | 1.5 | 90.0 | 91.5 | 98 |
| | 630 | 15 | 28 | 101 | 0.277 | 0.550 | 1.5 | 90.0 | 91.5 | 112 |
| | 725 | 30 | 60 | 103 | 0.583 | 0.550 | 1.5 | 90.0 | 91.5 | 120 |
| | 1225 | 15 | 17 | 187 | 0.091 | 0.550 | 1.5 | 90.0 | 91.5 | 68 |
| | 1632 | 30 | 43 | 307 | 0.140 | 0.550 | 1.5 | 90.0 | 91.5 | 86 |
| | 1850 | 10 | 13 | 53 | 0.245 | 0.550 | 1.5 | 90.0 | 91.5 | 78 |
| | 2010 | 20 | 9 | 7 | 1.286 | 0.550 | 1.5 | 90.0 | 91.5 | 27 |
| | 2208 | 20 | 19 | 27 | 0.704 | 0.550 | 1.5 | 90.0 | 91.5 | 57 |
| | 2325 | 30 | 46 | 67 | 0.687 | 0.550 | 1.5 | 90.0 | 91.5 | 92 |
| 28 Aug | 5 | 20 | 26 | 45 | 0.578 | 0.550 | 1.5 | 90.0 | 91.5 | 78 |
| | 230 | 20 | 21 | 136 | 0.154 | 0.600 | 1.5 | 90.0 | 91.5 | 63 |
| | 520 | 30 | 18 | 56 | 0.321 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 650 | 10 | 4 | 13 | 0.308 | 0.600 | 1.5 | 90.0 | 91.5 | 24 |
| | 720 | 15 | 2 | 3 | 0.667 | 0.600 | 1.5 | 90.0 | 91.5 | 8 |
| | 1025 | 15 | 2 | 1 | 2.000 | 0.600 | 1.5 | 90.0 | 91.5 | 8 |
| | 2115 | 20 | 31 | 39 | 0.795 | 0.600 | 1.5 | 90.0 | 91.5 | 93 |
| | 2200 | 25 | 127 | 159 | 0.799 | 0.600 | 1.5 | 90.0 | 91.5 | 305 |
| | 2312 | 20 | 83 | 115 | 0.722 | 0.600 | 1.5 | 90.0 | 91.5 | 249 |
| 29 Aug | 13 | 15 | 44 | 126 | 0.349 | 0.600 | 1.5 | 90.0 | 91.5 | 176 |
| | 210 | 20 | 12 | 15 | 0.800 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 515 | 15 | 1 | 0 | -- | 0.600 | 1.5 | 90.0 | 91.5 | 4 |
| | 620 | 15 | 8 | 12 | 0.667 | 0.600 | 1.5 | 90.0 | 91.5 | 32 |
| | 710 | 30 | 10 | 16 | 0.625 | 0.600 | 1.5 | 90.0 | 91.5 | 20 |
| | 1010 | 15 | 8 | 6 | 1.333 | 0.600 | 1.5 | 90.0 | 91.5 | 32 |
| | 1202 | 20 | 14 | 105 | 0.133 | 0.600 | 1.5 | 90.0 | 91.5 | 42 |
| | 1815 | 20 | 14 | 22 | 0.636 | 0.600 | 1.5 | 90.0 | 91.5 | 42 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2040 | 20 | 6 | 8 | 0.750 | 0.600 | 1.5 | 90.0 | 91.5 | 18 |
| | 2238 | 20 | 42 | 101 | 0.416 | 0.600 | 1.5 | 90.0 | 91.5 | 126 |
| | 2330 | 20 | 35 | 79 | 0.443 | 0.600 | 1.5 | 90.0 | 91.5 | 105 |
| 30 Aug | 1 | 20 | 38 | 89 | 0.427 | 0.600 | 1.5 | 90.0 | 91.5 | 114 |
| | 200 | 20 | 10 | 31 | 0.323 | 0.600 | 1.5 | 90.0 | 91.5 | 30 |
| | 518 | 15 | 8 | 70 | 0.114 | 0.600 | 1.5 | 90.0 | 91.5 | 32 |
| | 640 | 15 | 17 | 34 | 0.500 | 0.600 | 1.5 | 90.0 | 91.5 | 68 |
| | 707 | 35 | 14 | 63 | 0.222 | 0.600 | 1.5 | 90.0 | 91.5 | 24 |
| | 1010 | 15 | 0 | 0 | -- | 0.600 | 1.5 | 90.0 | 91.5 | 0 |
| | 1300 | 15 | 5 | 6 | 0.833 | 0.600 | 1.5 | 90.0 | 91.5 | 20 |
| | 1800 | 15 | 7 | 13 | 0.538 | 0.600 | 1.5 | 90.0 | 91.5 | 28 |
| | 2005 | 20 | 8 | 13 | 0.615 | 0.600 | 1.5 | 90.0 | 91.5 | 24 |
| | 2240 | 20 | 10 | 18 | 0.556 | 0.600 | 1.5 | 90.0 | 91.5 | 30 |
| | 2335 | 20 | 32 | 48 | 0.667 | 0.600 | 1.5 | 90.0 | 91.5 | 96 |
| 31 Aug | 10 | 20 | 18 | 22 | 0.818 | 0.600 | 1.5 | 90.0 | 91.5 | 54 |
| | 205 | 20 | 30 | 60 | 0.500 | 0.600 | 1.5 | 90.0 | 91.5 | 90 |
| | 520 | 15 | 9 | 11 | 0.818 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 615 | 30 | 32 | 56 | 0.571 | 0.600 | 1.5 | 90.0 | 91.5 | 64 |
| | 716 | 15 | 9 | 20 | 0.450 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 1030 | 15 | 2 | 2 | 1.000 | 0.600 | 1.5 | 90.0 | 91.5 | 8 |
| | 2110 | 20 | 39 | 42 | 0.929 | 0.600 | 1.5 | 90.0 | 91.5 | 117 |
| | 2210 | 20 | 84 | 90 | 0.933 | 0.600 | 1.5 | 90.0 | 91.5 | 252 |
| | 2320 | 20 | 52 | 72 | 0.722 | 0.600 | 1.5 | 90.0 | 91.5 | 156 |
| 01 Sep | 20 | 20 | 40 | 50 | 0.800 | 0.600 | 1.5 | 90.0 | 91.5 | 120 |
| | 200 | 20 | 24 | 46 | 0.522 | 0.600 | 1.5 | 90.0 | 91.5 | 72 |
| | 805 | 45 | 33 | 49 | 0.673 | 0.600 | 1.5 | 90.0 | 91.5 | 44 |
| | 945 | 15 | 5 | 8 | 0.625 | 0.600 | 1.5 | 90.0 | 91.5 | 20 |
| | 1029 | 30 | 36 | 59 | 0.610 | 0.600 | 1.5 | 90.0 | 91.5 | 72 |
| | 1205 | 30 | 48 | 73 | 0.658 | 0.600 | 1.5 | 90.0 | 91.5 | 96 |
| | 1350 | 10 | 19 | 21 | 0.905 | 0.600 | 1.5 | 90.0 | 91.5 | 114 |
| | 1630 | 30 | 32 | 54 | 0.593 | 0.600 | 1.5 | 90.0 | 91.5 | 64 |
| | 2010 | 20 | 46 | 100 | 0.460 | 0.600 | 1.5 | 90.0 | 91.5 | 138 |
| | 2213 | 20 | 41 | 105 | 0.390 | 0.600 | 1.5 | 90.0 | 91.5 | 123 |
| | 2320 | 20 | 22 | 81 | 0.272 | 0.600 | 1.5 | 90.0 | 91.5 | 66 |
| 02 Sep | 1 | 20 | 37 | 102 | 0.363 | 0.600 | 1.5 | 90.0 | 91.5 | 111 |
| | 630 | 25 | 31 | 142 | 0.218 | 0.600 | 1.5 | 90.0 | 91.5 | 74 |
| | 1215 | 30 | 8 | 20 | 0.400 | 0.600 | 1.5 | 90.0 | 91.5 | 16 |
| | 1910 | 30 | 18 | 48 | 0.375 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 2220 | 20 | 89 | 75 | 1.187 | 0.600 | 1.5 | 90.0 | 91.5 | 267 |
| 03 Sep | 25 | 20 | 17 | 34 | 0.500 | 0.600 | 1.5 | 90.0 | 91.5 | 51 |
| | 210 | 20 | 31 | 725 | 0.043 | 0.600 | 1.5 | 90.0 | 91.5 | 93 |
| | 725 | 30 | 55 | 114 | 0.482 | 0.600 | 1.5 | 90.0 | 91.5 | 110 |
| | 825 | 30 | 22 | 35 | 0.629 | 0.600 | 1.5 | 90.0 | 91.5 | 44 |
| | 910 | 30 | 17 | 14 | 1.214 | 0.600 | 1.5 | 90.0 | 91.5 | 34 |
| | 1220 | 30 | 20 | 15 | 1.333 | 0.600 | 1.5 | 90.0 | 91.5 | 40 |
| | 2025 | 20 | 42 | 116 | 0.362 | 0.600 | 1.5 | 90.0 | 91.5 | 126 |
| | 2215 | 20 | 46 | 66 | 0.697 | 0.600 | 1.5 | 90.0 | 91.5 | 138 |
| | 2330 | 20 | 29 | 58 | 0.500 | 0.600 | 1.5 | 90.0 | 91.5 | 87 |
| 04 Sep | 15 | 20 | 68 | 142 | 0.479 | 0.600 | 1.5 | 90.0 | 91.5 | 204 |
| | 205 | 20 | 36 | 80 | 0.450 | 0.600 | 1.5 | 90.0 | 91.5 | 108 |
| | 503 | 30 | 36 | 50 | 0.720 | 0.600 | 1.5 | 90.0 | 91.5 | 72 |
| | 611 | 30 | 96 | 181 | 0.530 | 0.600 | 1.5 | 90.0 | 91.5 | 192 |
| | 730 | 30 | 28 | 154 | 0.182 | 0.600 | 1.5 | 90.0 | 91.5 | 56 |
| | 920 | 15 | 7 | 190 | 0.037 | 0.600 | 1.5 | 90.0 | 91.5 | 28 |
| | 1500 | 15 | 6 | 42 | 0.143 | 0.600 | 1.5 | 90.0 | 91.5 | 24 |
| | 1625 | 15 | 1 | 3 | 0.333 | 0.600 | 1.5 | 90.0 | 91.5 | 4 |
| | 1930 | 20 | 18 | 14 | 1.286 | 0.600 | 1.5 | 90.0 | 91.5 | 54 |
| | 2215 | 15 | 96 | 176 | 0.545 | 0.600 | 1.5 | 90.0 | 91.5 | 384 |
| | 2300 | 20 | 32 | 59 | 0.542 | 0.600 | 1.5 | 90.0 | 91.5 | 96 |
| 05 Sep | 20 | 20 | 60 | 129 | 0.465 | 0.600 | 1.5 | 90.0 | 91.5 | 180 |
| | 200 | 20 | 44 | 90 | 0.489 | 0.600 | 1.5 | 90.0 | 91.5 | 132 |
| | 545 | 15 | 53 | 73 | 0.726 | 0.600 | 1.5 | 90.0 | 91.5 | 212 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 630 | 30 | 46 | 64 | 0.719 | 0.600 | 1.5 | 90.0 | 91.5 | 92 |
| | 710 | 30 | 75 | 114 | 0.658 | 0.600 | 1.5 | 90.0 | 91.5 | 150 |
| | 1000 | 30 | 80 | 124 | 0.645 | 0.600 | 1.5 | 90.0 | 91.5 | 160 |
| | 1201 | 30 | 47 | 69 | 0.681 | 0.600 | 1.5 | 90.0 | 91.5 | 94 |
| | 1503 | 15 | 10 | 7 | 1.429 | 0.600 | 1.5 | 90.0 | 91.5 | 40 |
| | 2040 | 20 | 31 | 35 | 0.886 | 0.600 | 1.5 | 90.0 | 91.5 | 93 |
| | 2215 | 30 | 56 | 160 | 0.350 | 0.600 | 1.5 | 90.0 | 91.5 | 112 |
| | 2340 | 20 | 31 | 79 | 0.392 | 0.600 | 1.5 | 90.0 | 91.5 | 93 |
| 06 Sep | 30 | 20 | 32 | 90 | 0.356 | 0.600 | 1.5 | 90.0 | 91.5 | 96 |
| | 220 | 20 | 28 | 38 | 0.737 | 0.600 | 1.5 | 90.0 | 91.5 | 84 |
| | 515 | 30 | 27 | 61 | 0.443 | 0.600 | 1.5 | 90.0 | 91.5 | 54 |
| | 610 | 30 | 71 | 122 | 0.582 | 0.600 | 1.5 | 90.0 | 91.5 | 142 |
| | 712 | 30 | 51 | 134 | 0.381 | 0.600 | 1.5 | 90.0 | 91.5 | 102 |
| | 830 | 30 | 54 | 166 | 0.325 | 0.600 | 1.5 | 90.0 | 91.5 | 108 |
| | 1025 | 30 | 47 | 258 | 0.182 | 0.600 | 1.5 | 90.0 | 91.5 | 94 |
| | 1215 | 30 | 27 | 103 | 0.262 | 0.600 | 1.5 | 90.0 | 91.5 | 54 |
| | 1620 | 15 | 2 | 7 | 0.286 | 0.600 | 1.5 | 90.0 | 91.5 | 8 |
| | 1930 | 20 | 18 | 22 | 0.818 | 0.600 | 1.5 | 90.0 | 91.5 | 54 |
| | 2135 | 20 | 30 | 70 | 0.429 | 0.600 | 1.5 | 90.0 | 91.5 | 90 |
| | 2240 | 20 | 34 | 73 | 0.466 | 0.600 | 1.5 | 90.0 | 91.5 | 102 |
| | 2340 | 20 | 17 | 52 | 0.327 | 0.600 | 1.5 | 90.0 | 91.5 | 51 |
| 07 Sep | 35 | 20 | 46 | 85 | 0.541 | 0.600 | 1.5 | 90.0 | 91.5 | 138 |
| | 200 | 20 | 34 | 56 | 0.607 | 0.600 | 1.5 | 90.0 | 91.5 | 102 |
| | 520 | 30 | 48 | 83 | 0.578 | 0.600 | 1.5 | 90.0 | 91.5 | 96 |
| | 615 | 30 | 85 | 300 | 0.283 | 0.600 | 1.5 | 90.0 | 91.5 | 170 |
| | 705 | 30 | 67 | 177 | 0.379 | 0.600 | 1.5 | 90.0 | 91.5 | 134 |
| | 1035 | 20 | 39 | 519 | 0.075 | 0.600 | 1.5 | 90.0 | 91.5 | debris |
| | 1240 | 20 | 19 | 71 | 0.268 | 0.600 | 1.5 | 90.0 | 91.5 | 57 |
| | 1735 | 25 | 139 | 348 | 0.399 | 0.600 | 1.5 | 90.0 | 91.5 | 334 |
| | 2025 | 20 | 99 | 168 | 0.589 | 0.600 | 1.5 | 90.0 | 91.5 | 297 |
| | 2215 | 20 | 82 | 119 | 0.689 | 0.600 | 1.5 | 90.0 | 91.5 | 246 |
| | 2340 | 20 | 100 | 113 | 0.885 | 0.600 | 1.5 | 90.0 | 91.5 | 300 |
| 08 Sep | 40 | 20 | 26 | 69 | 0.377 | 0.600 | 1.5 | 90.0 | 91.5 | 78 |
| | 210 | 20 | 38 | 44 | 0.864 | 0.600 | 1.5 | 90.0 | 91.5 | 114 |
| | 505 | 30 | 70 | 319 | 0.219 | 0.600 | 1.5 | 90.0 | 91.5 | 140 |
| | 615 | 30 | 150 | 426 | 0.352 | 0.600 | 1.5 | 90.0 | 91.5 | 300 |
| | 730 | 30 | 51 | 126 | 0.405 | 0.600 | 1.5 | 90.0 | 91.5 | 102 |
| | 1015 | 20 | 20 | 148 | 0.135 | 0.600 | 1.5 | 90.0 | 91.5 | 60 |
| | 1202 | 30 | 38 | 121 | 0.314 | 0.600 | 1.5 | 90.0 | 91.5 | 76 |
| | 1607 | 30 | 59 | 469 | 0.126 | 0.600 | 1.5 | 90.0 | 91.5 | 118 |
| | 1920 | 30 | 80 | 83 | 0.964 | 0.600 | 1.5 | 90.0 | 91.5 | 160 |
| | 2005 | 30 | 107 | 94 | 1.138 | 0.600 | 1.5 | 90.0 | 91.5 | 214 |
| | 2240 | 20 | 102 | 160 | 0.638 | 0.600 | 1.5 | 90.0 | 91.5 | 306 |
| | 2320 | 20 | 153 | 151 | 1.013 | 0.600 | 1.5 | 90.0 | 91.5 | 459 |
| 09 Sep | 520 | 30 | 37 | 72 | 0.514 | 0.600 | 1.5 | 90.0 | 91.5 | 74 |
| | 607 | 30 | 78 | 211 | 0.370 | 0.600 | 1.5 | 90.0 | 91.5 | 156 |
| | 717 | 30 | 59 | 151 | 0.391 | 0.600 | 1.5 | 90.0 | 91.5 | 118 |
| | 1700 | 30 | 47 | 584 | 0.080 | 0.600 | 1.5 | 90.0 | 91.5 | 94 |
| | 2020 | 30 | 25 | 44 | 0.568 | 0.600 | 1.5 | 90.0 | 91.5 | 50 |
| | 2205 | 20 | 46 | 193 | 0.238 | 0.600 | 1.5 | 90.0 | 91.5 | 138 |
| | 2305 | 30 | 63 | 348 | 0.181 | 0.600 | 1.5 | 90.0 | 91.5 | 126 |
| 10 Sep | 5 | 16 | 68 | 706 | 0.096 | 0.600 | 1.5 | 90.0 | 91.5 | 255 |
| | 200 | 25 | 50 | 677 | 0.074 | 0.600 | 1.5 | 90.0 | 91.5 | 120 |
| | 620 | 30 | 72 | 590 | 0.122 | 0.600 | 1.5 | 90.0 | 91.5 | 144 |
| | 715 | 30 | 103 | 1129 | 0.091 | 0.600 | 1.5 | 90.0 | 91.5 | 206 |
| | 1220 | 20 | 48 | 112 | 0.429 | 0.600 | 1.5 | 90.0 | 91.5 | 144 |
| | 1230 | 30 | 25 | 143 | -- | 0.600 | 1.5 | 90.0 | 91.5 | |
| | 2020 | 30 | 85 | 75 | 1.133 | 0.600 | 1.5 | 90.0 | 91.5 | 170 |
| | 2205 | 15 | 69 | 53 | 1.302 | 0.600 | 1.5 | 90.0 | 91.5 | 276 |
| | 2315 | 15 | 65 | 72 | 0.903 | 0.600 | 1.5 | 90.0 | 91.5 | 260 |
| 11 Sep | 10 | 25 | 87 | 133 | 0.654 | 0.600 | 1.5 | 90.0 | 91.5 | 209 |
| | 202 | 20 | 37 | 80 | 0.463 | 0.600 | 1.5 | 90.0 | 91.5 | 111 |
| | 500 | 30 | 58 | 119 | 0.487 | 0.600 | 1.5 | 90.0 | 91.5 | 116 |
| | 615 | 20 | 62 | 135 | 0.459 | 0.600 | 1.5 | 90.0 | 91.5 | 186 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 730 | 30 | 32 | 93 | 0.344 | 0.600 | 1.5 | 90.0 | 91.5 | 64 |
| | 1020 | 30 | 28 | 41 | 0.683 | 0.600 | 1.5 | 90.0 | 91.5 | 56 |
| | 1220 | 20 | 16 | 25 | 0.640 | 0.600 | 1.5 | 90.0 | 91.5 | 48 |
| | 1720 | 20 | 6 | 16 | 0.375 | 0.600 | 1.5 | 90.0 | 91.5 | 18 |
| | 1925 | 30 | 28 | 52 | 0.538 | 0.600 | 1.5 | 90.0 | 91.5 | 56 |
| | 2205 | 20 | 63 | 111 | 0.568 | 0.600 | 1.5 | 90.0 | 91.5 | 189 |
| | 2301 | 30 | 70 | 166 | 0.422 | 0.600 | 1.5 | 90.0 | 91.5 | 140 |
| 12 Sep | 1 | 20 | 58 | 151 | 0.384 | 0.600 | 1.5 | 90.0 | 91.5 | 174 |
| | 200 | 20 | 56 | 122 | 0.459 | 0.600 | 1.5 | 90.0 | 91.5 | 168 |
| | 525 | 30 | 35 | 140 | 0.250 | 0.600 | 1.5 | 90.0 | 91.5 | 70 |
| | 615 | 30 | 52 | 161 | 0.323 | 0.600 | 1.5 | 90.0 | 91.5 | 104 |
| | 700 | 30 | 36 | 88 | 0.409 | 0.600 | 1.5 | 90.0 | 91.5 | 72 |
| | 1215 | 20 | 11 | 27 | 0.407 | 0.600 | 1.5 | 90.0 | 91.5 | 33 |
| | 1553 | 25 | 45 | 41 | 1.098 | 0.600 | 1.5 | 90.0 | 91.5 | 108 |
| | 1815 | 20 | 57 | 28 | 2.036 | 0.600 | 1.5 | 90.0 | 91.5 | 171 |
| | 2040 | 15 | 81 | 75 | 1.080 | 0.600 | 1.5 | 90.0 | 91.5 | 324 |
| | 2210 | 15 | 68 | 91 | 0.747 | 0.600 | 1.5 | 90.0 | 91.5 | 272 |
| | 2305 | 30 | 102 | 136 | 0.750 | 0.600 | 1.5 | 90.0 | 91.5 | 204 |
| 13 Sep | 5 | 15 | 98 | 139 | 0.705 | 0.600 | 1.5 | 90.0 | 91.5 | 392 |
| | 205 | 30 | 66 | 125 | 0.528 | 0.600 | 1.5 | 90.0 | 91.5 | 132 |
| | 530 | 20 | 58 | 130 | 0.446 | 0.600 | 1.5 | 90.0 | 91.5 | 174 |
| | 605 | 20 | 67 | 93 | 0.720 | 0.600 | 1.5 | 90.0 | 91.5 | 201 |
| | 720 | 20 | 53 | 68 | 0.779 | 0.600 | 1.5 | 90.0 | 91.5 | 159 |
| | 1010 | 20 | 77 | 96 | 0.802 | 0.600 | 1.5 | 90.0 | 91.5 | 231 |
| | 1203 | 20 | 126 | 245 | 0.514 | 0.600 | 1.5 | 90.0 | 91.5 | 378 |
| | 1603 | 20 | 18 | 20 | 0.900 | 0.600 | 1.5 | 90.0 | 91.5 | 54 |
| | 1830 | 15 | 58 | 114 | 0.509 | 0.600 | 1.5 | 90.0 | 91.5 | 232 |
| | 2020 | 30 | 74 | 244 | 0.303 | 0.600 | 1.5 | 90.0 | 91.5 | 148 |
| | 2217 | 30 | 58 | 204 | 0.284 | 0.600 | 1.5 | 90.0 | 91.5 | 116 |
| | 2305 | 20 | 71 | 133 | 0.534 | 0.600 | 1.5 | 90.0 | 91.5 | 213 |
| 14 Sep | 2 | 30 | 59 | 142 | 0.415 | 0.600 | 1.5 | 90.0 | 91.5 | 118 |
| | 220 | 15 | 90 | 237 | 0.380 | 0.600 | 1.5 | 90.0 | 91.5 | 360 |
| | 520 | 20 | 84 | 255 | 0.329 | 0.600 | 1.5 | 90.0 | 91.5 | 252 |
| | 619 | 20 | 191 | 297 | 0.643 | 0.600 | 1.5 | 90.0 | 91.5 | 573 |
| | 704 | 20 | 116 | 155 | 0.748 | 0.600 | 1.5 | 90.0 | 91.5 | 348 |
| | 1010 | 30 | 38 | 44 | 0.864 | 0.600 | 1.5 | 90.0 | 91.5 | 76 |
| | 1206 | 30 | 30 | 32 | 0.938 | 0.600 | 1.5 | 90.0 | 91.5 | 60 |
| | 1618 | 30 | 55 | 64 | 0.859 | 0.600 | 1.5 | 90.0 | 91.5 | 110 |
| | 2017 | 30 | 52 | 57 | 0.912 | 0.600 | 1.5 | 90.0 | 91.5 | 104 |
| | 2232 | 15 | 67 | 186 | 0.360 | 0.600 | 1.5 | 90.0 | 91.5 | 268 |
| | 2302 | 15 | 105 | 264 | 0.398 | 0.600 | 1.5 | 90.0 | 91.5 | 420 |
| 15 Sep | 5 | 15 | 95 | 192 | 0.495 | 0.600 | 1.5 | 90.0 | 91.5 | 380 |
| | 220 | 15 | 67 | 501 | 0.134 | 0.600 | 1.5 | 90.0 | 91.5 | 268 |
| | 526 | 20 | 268 | 360 | 0.744 | 0.600 | 1.5 | 90.0 | 91.5 | 804 |
| | 605 | 20 | 318 | 537 | 0.592 | 0.600 | 1.5 | 90.0 | 91.5 | 954 |
| | 719 | 15 | 239 | 350 | 0.683 | 0.600 | 1.5 | 90.0 | 91.5 | 956 |
| | 1000 | 15 | 142 | 625 | 0.227 | 0.600 | 1.5 | 90.0 | 91.5 | 568 |
| | 1200 | 20 | 98 | 172 | 0.570 | 0.600 | 1.5 | 90.0 | 91.5 | 294 |
| | 1625 | 30 | 42 | 43 | 0.977 | 0.600 | 1.5 | 90.0 | 91.5 | 84 |
| | 1935 | 15 | 10 | 7 | 1.429 | 0.600 | 1.5 | 90.0 | 91.5 | 40 |
| | 2100 | 20 | 54 | 73 | 0.740 | 0.600 | 1.5 | 90.0 | 91.5 | 162 |
| | 2202 | 30 | 75 | 111 | 0.676 | 0.600 | 1.5 | 90.0 | 91.5 | 150 |
| | 2301 | 15 | 87 | 138 | 0.630 | 0.600 | 1.5 | 90.0 | 91.5 | 348 |
| 16 Sep | 10 | 15 | 80 | 155 | 0.516 | 0.600 | 1.5 | 90.0 | 91.5 | 320 |
| | 214 | 30 | 65 | 148 | 0.439 | 0.600 | 1.5 | 90.0 | 91.5 | 130 |
| | 530 | 20 | 58 | 121 | 0.479 | 0.600 | 1.5 | 90.0 | 91.5 | 174 |
| | 610 | 20 | 116 | 145 | 0.800 | 0.600 | 1.5 | 90.0 | 91.5 | 348 |
| | 700 | 20 | 86 | 132 | 0.652 | 0.600 | 1.5 | 90.0 | 91.5 | 258 |
| | 1000 | 20 | 62 | 92 | 0.674 | 0.600 | 1.5 | 90.0 | 91.5 | 186 |
| | 1200 | 20 | 111 | 256 | 0.434 | 0.600 | 1.5 | 90.0 | 91.5 | 333 |
| | 1600 | 20 | 56 | 77 | 0.727 | 0.600 | 1.5 | 90.0 | 91.5 | 168 |
| v | 1905 | 30 | 50 | 105 | 0.477 | 0.600 | 1.5 | 90.0 | 91.5 | |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2020 | 15 | 61 | 83 | 0.735 | 0.600 | 1.5 | 90.0 | 91.5 | 244 |
| | 2210 | 15 | 54 | 92 | 0.587 | 0.600 | 1.5 | 90.0 | 91.5 | 216 |
| | 2302 | 15 | 69 | 154 | 0.448 | 0.600 | 1.5 | 90.0 | 91.5 | 276 |
| 17 Sep | 25 | 15 | 59 | 356 | 0.166 | 0.600 | 1.5 | 90.0 | 91.5 | 236 |
| | 215 | 15 | 51 | 162 | 0.315 | 0.600 | 1.5 | 90.0 | 91.5 | 204 |
| | 524 | 20 | 58 | 131 | 0.443 | 0.600 | 1.5 | 90.0 | 91.5 | 174 |
| | 603 | 15 | 102 | 482 | 0.212 | 0.600 | 1.5 | 90.0 | 91.5 | 408 |
| | 725 | 20 | 57 | 86 | 0.663 | 0.600 | 1.5 | 90.0 | 91.5 | 171 |
| | 1012 | 15 | 98 | 216 | 0.454 | 0.600 | 1.5 | 90.0 | 91.5 | 392 |
| | 1200 | 30 | 80 | 217 | 0.369 | 0.600 | 1.5 | 90.0 | 91.5 | 160 |
| | 1603 | 15 | 9 | 11 | 0.818 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 2032 | 20 | 50 | 98 | 0.510 | 0.600 | 1.5 | 90.0 | 91.5 | 150 |
| | 2230 | 15 | 58 | 144 | 0.403 | 0.600 | 1.5 | 90.0 | 91.5 | 232 |
| | 2311 | 15 | 51 | 209 | 0.244 | 0.600 | 1.5 | 90.0 | 91.5 | 204 |
| 18 Sep | 7 | 15 | 62 | 199 | 0.312 | 0.600 | 1.5 | 90.0 | 91.5 | 248 |
| | 205 | 30 | 72 | 213 | 0.338 | 0.600 | 1.5 | 90.0 | 91.5 | 144 |
| | 530 | 15 | 84 | 350 | 0.240 | 0.600 | 1.5 | 90.0 | 91.5 | 336 |
| | 610 | 20 | 107 | 329 | 0.325 | 0.600 | 1.5 | 90.0 | 91.5 | 321 |
| | 701 | 20 | 51 | 75 | 0.680 | 0.600 | 1.5 | 90.0 | 91.5 | 153 |
| | 1001 | 20 | 65 | 203 | 0.320 | 0.600 | 1.5 | 90.0 | 91.5 | 195 |
| | 1205 | 30 | 29 | 42 | 0.690 | 0.600 | 1.5 | 90.0 | 91.5 | 58 |
| | 1657 | 30 | 47 | 52 | 0.904 | 0.600 | 1.5 | 90.0 | 91.5 | 94 |
| | 2004 | 30 | 66 | 60 | 1.100 | 0.600 | 1.5 | 90.0 | 91.5 | 132 |
| | 2235 | 20 | 51 | 83 | 0.614 | 0.600 | 1.5 | 90.0 | 91.5 | 153 |
| | 2312 | 30 | 50 | 54 | 0.926 | 0.600 | 1.5 | 90.0 | 91.5 | 100 |
| 19 Sep | 204 | 30 | 42 | 115 | 0.365 | 0.600 | 1.5 | 90.0 | 91.5 | 84 |
| | 526 | 15 | 57 | 107 | 0.533 | 0.600 | 1.5 | 90.0 | 91.5 | 228 |
| | 601 | 20 | 57 | 65 | 0.877 | 0.600 | 1.5 | 90.0 | 91.5 | 171 |
| | 701 | 20 | 51 | 67 | 0.761 | 0.600 | 1.5 | 90.0 | 91.5 | 153 |
| | 1001 | 20 | 56 | 94 | 0.596 | 0.600 | 1.5 | 90.0 | 91.5 | 168 |
| | 1221 | 30 | 41 | 145 | 0.283 | 0.600 | 1.5 | 90.0 | 91.5 | 82 |
| | 1601 | 30 | 88 | 216 | 0.407 | 0.600 | 1.5 | 90.0 | 91.5 | 176 |
| | 2012 | 30 | 53 | 81 | 0.654 | 0.600 | 1.5 | 90.0 | 91.5 | 106 |
| | 2240 | 15 | 51 | 94 | 0.543 | 0.600 | 1.5 | 90.0 | 91.5 | 204 |
| | 2315 | 30 | 70 | 127 | 0.551 | 0.600 | 1.5 | 90.0 | 91.5 | 140 |
| 20 Sep | 5 | 30 | 65 | 147 | 0.442 | 0.600 | 1.5 | 90.0 | 91.5 | 130 |
| | 212 | 30 | 43 | 68 | 0.632 | 0.600 | 1.5 | 90.0 | 91.5 | 86 |
| | 519 | 20 | 65 | 132 | 0.492 | 0.600 | 1.5 | 90.0 | 91.5 | 195 |
| | 601 | 20 | 62 | 193 | 0.321 | 0.600 | 1.5 | 90.0 | 91.5 | 186 |
| | 701 | 20 | 70 | 109 | 0.642 | 0.600 | 1.5 | 90.0 | 91.5 | 210 |
| | 1030 | 20 | 51 | 77 | 0.662 | 0.600 | 1.5 | 90.0 | 91.5 | 153 |
| | 1209 | 20 | 57 | 71 | 0.803 | 0.600 | 1.5 | 90.0 | 91.5 | 171 |
| | 1601 | 30 | 58 | 135 | 0.430 | 0.600 | 1.5 | 90.0 | 91.5 | 116 |
| | 2008 | 30 | 80 | 97 | 0.825 | 0.600 | 1.5 | 90.0 | 91.5 | 160 |
| | 2202 | 15 | 83 | 141 | 0.589 | 0.600 | 1.5 | 90.0 | 91.5 | 332 |
| | 2310 | 20 | 103 | 162 | 0.636 | 0.600 | 1.5 | 90.0 | 91.5 | 309 |
| 21 Sep | 20 | 20 | 71 | 199 | 0.357 | 0.600 | 1.5 | 90.0 | 91.5 | 213 |
| | 220 | 30 | 63 | 251 | 0.251 | 0.600 | 1.5 | 90.0 | 91.5 | 126 |
| | 530 | 30 | 30 | 84 | 0.357 | 0.600 | 1.5 | 90.0 | 91.5 | 60 |
| | 620 | 20 | 92 | 224 | 0.411 | 0.600 | 1.5 | 90.0 | 91.5 | 276 |
| | 701 | 21 | 109 | 221 | 0.493 | 0.600 | 1.5 | 90.0 | 91.5 | 311 |
| | 1001 | 30 | 43 | 109 | 0.394 | 0.600 | 1.5 | 90.0 | 91.5 | 86 |
| | 1201 | 30 | 46 | 315 | 0.146 | 0.600 | 1.5 | 90.0 | 91.5 | 92 |
| | 1601 | 30 | 31 | 35 | 0.886 | 0.600 | 1.5 | 90.0 | 91.5 | 62 |
| | 2012 | 30 | 52 | 44 | 1.182 | 0.600 | 1.5 | 90.0 | 91.5 | 104 |
| | 2237 | 30 | 45 | 117 | 0.385 | 0.600 | 1.5 | 90.0 | 91.5 | 90 |
| | 2320 | 30 | 35 | 29 | 1.207 | 0.600 | 1.5 | 90.0 | 91.5 | 70 |
| 22 Sep | 15 | 30 | 36 | 245 | 0.147 | 0.600 | 1.5 | 90.0 | 91.5 | 72 |
| | 213 | 30 | 31 | 32 | 0.969 | 0.600 | 1.5 | 90.0 | 91.5 | 62 |
| | 525 | 20 | 44 | 57 | 0.772 | 0.600 | 1.5 | 90.0 | 91.5 | 132 |
| | 604 | 30 | 43 | 56 | 0.768 | 0.600 | 1.5 | 90.0 | 91.5 | 86 |
| | 709 | 30 | 60 | 97 | 0.619 | 0.600 | 1.5 | 90.0 | 91.5 | 120 |

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Appendix A.9. (Page 8 of 8).

| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1012 | 30 | 59 | 86 | 0.686 | 0.600 | 1.5 | 90.0 | 91.5 | 118 |
| | 1229 | 15 | 6 | 11 | 0.545 | 0.600 | 1.5 | 90.0 | 91.5 | 24 |
| [v] | 1400 | 30 | 3 | 14 | 0.215 | 0.600 | 1.5 | 90.0 | 91.5 | |
| | 1601 | 15 | 9 | 11 | 0.818 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 2016 | 30 | 84 | 89 | 0.944 | 0.600 | 1.5 | 90.0 | 91.5 | 168 |
| | 2235 | 25 | 37 | 33 | 1.121 | 0.600 | 1.5 | 90.0 | 91.5 | 89 |
| | 2312 | 30 | 46 | 43 | 1.070 | 0.600 | 1.5 | 90.0 | 91.5 | 92 |
| 23 Sep | 4 | 30 | 50 | 69 | 0.725 | 0.600 | 1.5 | 90.0 | 91.5 | 100 |
| | 222 | 30 | 55 | 63 | 0.873 | 0.600 | 1.5 | 90.0 | 91.5 | 110 |
| | 507 | 15 | 10 | 13 | 0.769 | 0.600 | 1.5 | 90.0 | 91.5 | 40 |
| | 601 | 30 | 38 | 87 | 0.437 | 0.600 | 1.5 | 90.0 | 91.5 | 76 |
| | 701 | 30 | 44 | 51 | 0.863 | 0.600 | 1.5 | 90.0 | 91.5 | 88 |
| | 1001 | 30 | 22 | 25 | 0.880 | 0.600 | 1.5 | 90.0 | 91.5 | 44 |
| | 1212 | 30 | 41 | 86 | 0.477 | 0.600 | 1.5 | 90.0 | 91.5 | 82 |
| | 1601 | 30 | 34 | 43 | 0.791 | 0.600 | 1.5 | 90.0 | 91.5 | 68 |
| | 2012 | 30 | 29 | 21 | 1.381 | 0.600 | 1.5 | 90.0 | 91.5 | 58 |
| | 2233 | 15 | 9 | 10 | 0.900 | 0.600 | 1.5 | 90.0 | 91.5 | 36 |
| | 2310 | 30 | 63 | 232 | 0.272 | 0.600 | 1.5 | 90.0 | 91.5 | 126 |
| 24 Sep | 15 | 30 | 76 | 158 | 0.481 | 0.600 | 1.5 | 90.0 | 91.5 | 152 |
| | 206 | 20 | 43 | 298 | 0.144 | 0.600 | 1.5 | 90.0 | 91.5 | 129 |
| | 512 | 30 | 38 | 95 | 0.400 | 0.600 | 1.5 | 90.0 | 91.5 | 76 |
| | 601 | 20 | 67 | 284 | 0.236 | 0.600 | 1.5 | 90.0 | 91.5 | 201 |
| | 705 | 20 | 144 | 255 | 0.565 | 0.600 | 1.5 | 90.0 | 91.5 | 432 |
| | 1010 | 20 | 55 | 511 | 0.108 | 0.600 | 1.5 | 90.0 | 91.5 | 165 |
| | 1201 | 20 | 45 | 785 | 0.057 | 0.600 | 1.5 | 90.0 | 91.5 | 135 |
| Total | 462 | 9,743 | 17,964 | 43,841 | 0.410 | | | | | |

[a] The "adjustment factor" is the oscilloscope count divided by the sonar count, and was used to adjust sonar counts.

[b] Pulse repetition rate of the sonar counter at start of calibration period. When the PRR was changed, that change is reflected in the PRR shown for the start of the next calibration period.

[v] Visual calibration.

Appendix A.10. Oscilloscope calibrations made to the 1977-model sonar counter at the Sheenjek River project site in 1992.

| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 Aug | 2313 | 15 | 5 | 11 | 0.455 | 0.510 | 3.0 | 98.0 | 101.0 | 20 |
| 11 Aug | 130 | 15 | 1 | 3 | 0.333 | 0.600 | 3.0 | 98.0 | 101.0 | 4 |
| 12 Aug | 2343 | 15 | 3 | 3 | 1.000 | 0.500 | 3.0 | 98.0 | 101.0 | 12 |
| 13 Aug | 2 | 15 | 1 | 2 | 0.500 | 0.500 | 3.0 | 98.0 | 101.0 | 4 |
| | 135 | 25 | 11 | 9 | 1.222 | 0.500 | 3.0 | 98.0 | 101.0 | 26 |
| | 200 | 15 | 6 | 2 | 3.000 | 0.500 | 3.0 | 98.0 | 101.0 | 24 |
| | 730 | 15 | 2 | 1 | 2.000 | 0.500 | 3.0 | 98.0 | 101.0 | 8 |
| | 2030 | 15 | 4 | 4 | 1.000 | 0.500 | 3.0 | 67.0 | 70.0 | 16 |
| | 2337 | 15 | 5 | 3 | 1.667 | 0.500 | 3.0 | 67.0 | 70.0 | 20 |
| 14 Aug | 1 | 30 | 3 | 2 | 1.500 | 0.500 | 3.0 | 67.0 | 70.0 | 6 |
| | 720 | 15 | 0 | 0 | -- | 0.500 | 3.0 | 67.0 | 70.0 | 0 |
| 15 Aug | 40 | 30 | 14 | 9 | 1.556 | 0.500 | 3.0 | 67.0 | 70.0 | 28 |
| | 116 | 15 | 10 | 4 | 2.500 | 0.500 | 3.0 | 67.0 | 70.0 | 40 |
| | 133 | 15 | 12 | 12 | 1.000 | 0.400 | 3.0 | 67.0 | 70.0 | 48 |
| | 710 | 15 | 1 | 1 | 1.000 | 0.400 | 3.0 | 67.0 | 70.0 | 4 |
| | 2315 | 15 | 13 | 11 | 1.182 | 0.400 | 3.0 | 67.0 | 70.0 | 52 |
| | 2333 | 15 | 11 | 12 | 0.917 | 0.400 | 3.0 | 67.0 | 70.0 | 44 |
| 16 Aug | 7 | 41 | 26 | 21 | 1.238 | 0.400 | 3.0 | 67.0 | 70.0 | 38 |
| | 116 | 15 | 23 | 35 | 0.657 | 0.400 | 3.0 | 67.0 | 70.0 | 92 |
| | 204 | 30 | 35 | 50 | 0.700 | 0.400 | 3.0 | 67.0 | 70.0 | 70 |
| | 313 | 15 | 10 | 11 | 0.909 | 0.400 | 3.0 | 67.0 | 70.0 | 40 |
| | 705 | 45 | 13 | 14 | 0.929 | 0.400 | 3.0 | 77.0 | 80.0 | 17 |
| | 2118 | 30 | 8 | 6 | 1.333 | 0.400 | 3.0 | 67.0 | 70.0 | 16 |
| | 2320 | 30 | 63 | 63 | 1.000 | 0.400 | 3.0 | 67.0 | 70.0 | 126 |
| 17 Aug | 10 | 30 | 44 | 46 | 0.957 | 0.400 | 3.0 | 67.0 | 70.0 | 88 |
| | 137 | 15 | 10 | 12 | 0.833 | 0.400 | 3.0 | 67.0 | 70.0 | 40 |
| | 207 | 30 | 21 | 25 | 0.840 | 0.400 | 3.0 | 67.0 | 70.0 | 42 |
| | 705 | 45 | 86 | 146 | 0.589 | 0.400 | 3.0 | 67.0 | 70.0 | 115 |
| | 1003 | 15 | 2 | 2 | 1.000 | 0.400 | 3.0 | 67.0 | 70.0 | 8 |
| | 1205 | 15 | 6 | 6 | 1.000 | 0.400 | 3.0 | 67.0 | 70.0 | 24 |
| | 1751 | 9 | 10 | 18 | 0.556 | 0.400 | 3.0 | 67.0 | 70.0 | 67 |
| | 1803 | 15 | 7 | 7 | 1.000 | 0.400 | 3.0 | 67.0 | 70.0 | 28 |
| | 2101 | 15 | 9 | 12 | 0.750 | 0.400 | 3.0 | 67.0 | 70.0 | 36 |
| | 2325 | 30 | 50 | 61 | 0.820 | 0.400 | 3.0 | 67.0 | 70.0 | 100 |
| 18 Aug | 8 | 30 | 23 | 23 | 1.000 | 0.488 | 3.0 | 67.0 | 70.0 | 46 |
| | 210 | 30 | 139 | 437 | 0.318 | 0.488 | 3.0 | 67.0 | 70.0 | 278 |
| | 702 | 30 | 29 | 51 | 0.569 | 0.488 | 3.0 | 67.0 | 70.0 | 58 |
| | 1201 | 15 | 4 | 3 | 1.333 | 0.488 | 3.0 | 67.0 | 70.0 | 16 |
| | 1801 | 15 | 0 | 0 | -- | 0.488 | 3.0 | 67.0 | 70.0 | 0 |
| | 2116 | 15 | 7 | 12 | 0.583 | 0.488 | 3.0 | 67.0 | 70.0 | 28 |
| | 2335 | 15 | 9 | 9 | 1.000 | 0.488 | 3.0 | 67.0 | 70.0 | 36 |
| 19 Aug | 20 | 15 | 8 | 7 | 1.143 | 0.488 | 3.0 | 67.0 | 70.0 | 32 |
| | 110 | 30 | 53 | 153 | 0.346 | 0.488 | 3.0 | 67.0 | 70.0 | 106 |
| | 201 | 59 | 54 | 84 | 0.643 | 0.999 | 3.0 | 67.0 | 70.0 | 55 |
| | 541 | 15 | 12 | 15 | 0.800 | 0.999 | 3.0 | 67.0 | 70.0 | 48 |
| | 603 | 30 | 22 | 26 | 0.846 | 0.999 | 3.0 | 67.0 | 70.0 | 44 |
| | 701 | 15 | 8 | 13 | 0.615 | 0.500 | 3.0 | 67.0 | 70.0 | 32 |
| | 1201 | 15 | 5 | 6 | 0.833 | 0.999 | 3.0 | 67.0 | 70.0 | 20 |
| | 1801 | 15 | 0 | 0 | -- | 0.999 | 3.0 | 67.0 | 70.0 | 0 |
| | 2127 | 15 | 5 | 5 | 1.000 | 0.999 | 3.0 | 67.0 | 70.0 | 20 |
| | 2315 | 15 | 21 | 10 | 2.100 | 0.999 | 3.0 | 67.0 | 70.0 | 84 |
| | 2332 | 10 | 23 | 113 | 0.204 | 0.500 | 3.0 | 67.0 | 70.0 | 138 |
| 20 Aug | 5 | 38 | 165 | 624 | 0.264 | 0.999 | 3.0 | 67.0 | 70.0 | 261 |
| | 115 | 30 | 64 | 97 | 0.660 | 0.999 | 3.0 | 67.0 | 70.0 | 128 |
| | 220 | 30 | 122 | 384 | 0.318 | 0.999 | 3.0 | 67.0 | 70.0 | 244 |
| | 528 | 30 | 154 | 474 | 0.325 | 0.999 | 3.0 | 67.0 | 70.0 | 308 |
| | 623 | 30 | 94 | 288 | 0.326 | 0.999 | 3.0 | 67.0 | 70.0 | 188 |
| | 1204 | 15 | 2 | 3 | 0.667 | 0.999 | 3.0 | 67.0 | 70.0 | 8 |
| | 1805 | 15 | 0 | 0 | -- | 0.999 | 3.0 | 67.0 | 70.0 | 0 |
| | 2130 | 15 | 0 | 0 | -- | 0.999 | 3.0 | 80.0 | 83.0 | 0 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2307 | 30 | 39 | 63 | 0.619 | 0.400 | 3.0 | 80.0 | 83.0 | 78 |
| | 2341 | 10 | 28 | 26 | 1.077 | 0.646 | 3.0 | 80.0 | 83.0 | 168 |
| 21 Aug | 10 | 30 | 69 | 86 | 0.802 | 0.646 | 3.0 | 80.0 | 83.0 | 138 |
| | 115 | 30 | 35 | 49 | 0.714 | 0.646 | 3.0 | 80.0 | 83.0 | 70 |
| | 218 | 30 | 52 | 84 | 0.619 | 0.646 | 3.0 | 80.0 | 83.0 | 104 |
| | 601 | 45 | 35 | 40 | 0.875 | 0.646 | 3.0 | 80.0 | 83.0 | 47 |
| | 1210 | 15 | 2 | 3 | 0.667 | 0.646 | 3.0 | 80.0 | 83.0 | 8 |
| | 1804 | 15 | 4 | 6 | 0.667 | 0.646 | 3.0 | 80.0 | 83.0 | 16 |
| | 2110 | 40 | 34 | 49 | 0.694 | 0.646 | 3.0 | 80.0 | 83.0 | 51 |
| | 2310 | 30 | 87 | 101 | 0.861 | 0.646 | 3.0 | 80.0 | 83.0 | 174 |
| 22 Aug | 10 | 30 | 74 | 93 | 0.796 | 0.646 | 3.0 | 80.0 | 83.0 | 148 |
| | 41 | 10 | 26 | 20 | 1.300 | 0.810 | 3.0 | 80.0 | 83.0 | 156 |
| | 109 | 30 | 77 | 90 | 0.856 | 0.646 | 3.0 | 80.0 | 83.0 | 154 |
| | 210 | 15 | 7 | 7 | 1.000 | 0.646 | 3.0 | 80.0 | 83.0 | 28 |
| | 602 | 30 | 59 | 73 | 0.808 | 0.646 | 3.0 | 68.0 | 71.0 | 118 |
| | 635 | 15 | 16 | 19 | 0.842 | 0.794 | 3.0 | 68.0 | 71.0 | 64 |
| | 1201 | 15 | 0 | 0 | -- | 0.794 | 3.0 | 68.0 | 71.0 | 0 |
| | 1802 | 30 | 18 | 20 | 0.900 | 0.794 | 3.0 | 68.0 | 71.0 | 36 |
| | 2105 | 30 | 23 | 38 | 0.605 | 0.794 | 3.0 | 68.0 | 71.0 | 46 |
| | 2332 | 30 | 35 | 34 | 1.029 | 0.794 | 3.0 | 68.0 | 71.0 | 70 |
| 23 Aug | 201 | 30 | 72 | 88 | 0.818 | 0.794 | 3.0 | 68.0 | 71.0 | 144 |
| | 611 | 15 | 9 | 17 | 0.529 | 0.794 | 3.0 | 68.0 | 71.0 | 36 |
| | 1204 | 15 | 3 | 2 | 1.500 | 0.794 | 3.0 | 68.0 | 71.0 | 12 |
| | 1830 | 15 | 0 | 0 | -- | 0.794 | 3.0 | 68.0 | 71.0 | 0 |
| | 2105 | 15 | 2 | 1 | 2.000 | 0.794 | 3.0 | 68.0 | 71.0 | 8 |
| | 2325 | 30 | 44 | 50 | 0.880 | 0.794 | 3.0 | 68.0 | 71.0 | 88 |
| 24 Aug | 215 | 30 | 95 | 106 | 0.896 | 0.794 | 3.0 | 68.0 | 71.0 | 190 |
| | 605 | 30 | 26 | 34 | 0.765 | 0.794 | 3.0 | 68.0 | 71.0 | 52 |
| | 1203 | 15 | 3 | 6 | 0.500 | 0.794 | 3.0 | 68.0 | 71.0 | 12 |
| | 1802 | 15 | 5 | 7 | 0.714 | 0.794 | 3.0 | 65.0 | 68.0 | 20 |
| | 2119 | 15 | 7 | 9 | 0.778 | 0.794 | 3.0 | 55.0 | 58.0 | 28 |
| | 2328 | 30 | 42 | 45 | 0.933 | 0.794 | 3.0 | 55.0 | 58.0 | 84 |
| 25 Aug | 123 | 30 | 61 | 63 | 0.968 | 0.794 | 3.0 | 60.0 | 63.0 | 122 |
| | 228 | 30 | 53 | 60 | 0.883 | 0.794 | 3.0 | 60.0 | 63.0 | 106 |
| | 605 | 30 | 44 | 40 | 1.100 | 0.794 | 3.0 | 60.0 | 63.0 | 88 |
| | 1123 | 15 | 7 | 7 | 1.000 | 0.794 | 3.0 | 60.0 | 63.0 | 28 |
| | 1803 | 15 | 2 | 3 | 0.667 | 0.794 | 3.0 | 60.0 | 63.0 | 8 |
| | 2135 | 15 | 2 | 4 | 0.500 | 0.794 | 3.0 | 60.0 | 63.0 | 8 |
| | 2302 | 30 | 30 | 41 | 0.732 | 0.794 | 3.0 | 60.0 | 63.0 | 60 |
| 26 Aug | 102 | 30 | 32 | 36 | 0.889 | 0.794 | 3.0 | 60.0 | 63.0 | 64 |
| | 208 | 30 | 16 | 15 | 1.067 | 0.794 | 3.0 | 60.0 | 63.0 | 32 |
| | 540 | 15 | 5 | 6 | 0.833 | 0.794 | 3.0 | 60.0 | 63.0 | 20 |
| | 602 | 15 | 9 | 12 | 0.750 | 0.794 | 3.0 | 60.0 | 63.0 | 36 |
| | 1215 | 15 | 2 | 4 | 0.500 | 0.794 | 3.0 | 60.0 | 63.0 | 8 |
| | 1801 | 15 | 4 | 5 | 0.800 | 0.794 | 3.0 | 60.0 | 63.0 | 16 |
| | 2103 | 15 | 6 | 5 | 1.200 | 0.794 | 3.0 | 60.0 | 63.0 | 24 |
| | 2329 | 30 | 19 | 17 | 1.118 | 0.794 | 3.0 | 60.0 | 63.0 | 38 |
| 27 Aug | 105 | 30 | 40 | 61 | 0.656 | 0.794 | 3.0 | 60.0 | 63.0 | 80 |
| | 202 | 15 | 15 | 18 | 0.833 | 0.794 | 3.0 | 60.0 | 63.0 | 60 |
| | 535 | 15 | 5 | 9 | 0.556 | 0.794 | 3.0 | 60.0 | 63.0 | 20 |
| | 1202 | 15 | 0 | 0 | -- | 0.794 | 3.0 | 60.0 | 63.0 | 0 |
| | 1805 | 15 | 3 | 4 | 0.750 | 0.794 | 3.0 | 60.0 | 63.0 | 12 |
| | 2105 | 15 | 2 | 3 | 0.667 | 0.794 | 3.0 | 60.0 | 63.0 | 8 |
| | 2304 | 30 | 38 | 56 | 0.679 | 0.794 | 3.0 | 60.0 | 63.0 | 76 |
| 28 Aug | 105 | 30 | 41 | 42 | 0.976 | 0.794 | 3.0 | 60.0 | 63.0 | 82 |
| | 208 | 30 | 29 | 29 | 1.000 | 0.794 | 3.0 | 60.0 | 63.0 | 58 |
| | 605 | 15 | 8 | 9 | 0.889 | 0.794 | 3.0 | 60.0 | 63.0 | 32 |
| | 1201 | 15 | 1 | 1 | 1.000 | 0.794 | 3.0 | 60.0 | 63.0 | 4 |
| | 1805 | 15 | 0 | 0 | -- | 0.794 | 3.0 | 60.0 | 63.0 | 0 |
| | 2116 | 15 | 4 | 2 | 2.000 | 0.794 | 3.0 | 55.0 | 58.0 | 16 |
| | 2329 | 30 | 19 | 27 | 0.704 | 0.794 | 3.0 | 55.0 | 58.0 | 38 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| 29 Aug | 208 | 15 | 6 | 5 | 1.200 | 0.794 | 3.0 | 55.0 | 58.0 | 24 |
| | 626 | 15 | 4 | 6 | 0.667 | 0.794 | 3.0 | 55.0 | 58.0 | 16 |
| | 1204 | 15 | 0 | 0 | -- | 0.794 | 3.0 | 100.0 | 103.0 | 0 |
| | 2332 | 15 | 7 | 9 | 0.778 | 0.794 | 3.0 | 80.0 | 83.0 | 28 |
| 30 Aug | 37 | 30 | 22 | 19 | 1.158 | 0.794 | 3.0 | 80.0 | 83.0 | 44 |
| | 606 | 30 | 20 | 14 | 1.429 | 0.794 | 3.0 | 75.0 | 78.0 | 40 |
| | 640 | 15 | 14 | 13 | 1.077 | 0.555 | 3.0 | 75.0 | 78.0 | 56 |
| | 721 | 30 | 5 | 6 | 0.833 | 0.555 | 3.0 | 75.0 | 78.0 | 10 |
| | 1204 | 15 | 9 | 9 | 1.000 | 0.555 | 3.0 | 75.0 | 78.0 | 36 |
| | 1805 | 20 | 6 | 5 | 1.200 | 0.555 | 3.0 | 70.0 | 73.0 | 18 |
| | 2110 | 20 | 6 | 3 | 2.000 | 0.555 | 3.0 | 70.0 | 73.0 | 18 |
| | 2335 | 20 | 8 | 5 | 1.600 | 0.555 | 3.0 | 70.0 | 73.0 | 24 |
| 31 Aug | 202 | 15 | 6 | 6 | 1.000 | 0.456 | 3.0 | 70.0 | 73.0 | 24 |
| | 610 | 15 | 9 | 11 | 0.818 | 0.456 | 3.0 | 70.0 | 73.0 | 36 |
| | 1205 | 15 | 9 | 12 | 0.750 | 0.456 | 3.0 | 70.0 | 73.0 | 36 |
| | 1805 | 15 | 2 | 5 | 0.400 | 0.456 | 3.0 | 70.0 | 73.0 | 8 |
| | 2114 | 15 | 10 | 11 | 0.909 | 0.456 | 3.0 | 70.0 | 73.0 | 40 |
| | 2302 | 15 | 8 | 8 | 1.000 | 0.456 | 3.0 | 70.0 | 73.0 | 32 |
| 01 Sep | 5 | 15 | 3 | 3 | 1.000 | 0.537 | 3.0 | 70.0 | 73.0 | 12 |
| | 105 | 15 | 6 | 4 | 1.500 | 0.537 | 3.0 | 70.0 | 73.0 | 24 |
| | 215 | 15 | 7 | 6 | 1.167 | 0.537 | 3.0 | 70.0 | 73.0 | 28 |
| | 525 | 30 | 13 | 12 | 1.083 | 0.537 | 3.0 | 70.0 | 73.0 | 26 |
| | 1202 | 15 | 11 | 9 | 1.222 | 0.537 | 3.0 | 70.0 | 73.0 | 44 |
| | 1845 | 15 | 3 | 3 | 1.000 | 0.537 | 3.0 | 70.0 | 73.0 | 12 |
| | 2109 | 15 | 6 | 7 | 0.857 | 0.537 | 3.0 | 70.0 | 73.0 | 24 |
| | 2335 | 25 | 22 | 23 | 0.957 | 0.537 | 3.0 | 70.0 | 73.0 | 53 |
| 02 Sep | 17 | 25 | 32 | 33 | 0.970 | 0.537 | 3.0 | 90.0 | 93.0 | 77 |
| | 110 | 30 | 22 | 21 | 1.048 | 0.537 | 3.0 | 90.0 | 93.0 | 44 |
| | 520 | 30 | 28 | 32 | 0.875 | 0.537 | 3.0 | 90.0 | 93.0 | 56 |
| | 1214 | 15 | 9 | 11 | 0.818 | 0.537 | 3.0 | 90.0 | 93.0 | 36 |
| | 1840 | 15 | 6 | 7 | 0.857 | 0.537 | 1.5 | 68.5 | 70.0 | 24 |
| | 2105 | 30 | 39 | 44 | 0.886 | 0.537 | 1.5 | 68.5 | 70.0 | 78 |
| | 2315 | 15 | 45 | 63 | 0.714 | 0.537 | 1.5 | 68.5 | 70.0 | 180 |
| 03 Sep | 10 | 30 | 24 | 24 | 1.000 | 0.537 | 1.5 | 68.5 | 70.0 | 48 |
| | 135 | 25 | 35 | 38 | 0.921 | 0.537 | 1.5 | 68.5 | 70.0 | 84 |
| | 230 | 25 | 16 | 19 | 0.842 | 0.537 | 1.5 | 68.5 | 70.0 | 38 |
| | 525 | 30 | 47 | 51 | 0.922 | 0.537 | 1.5 | 68.5 | 70.0 | 94 |
| | 608 | 30 | 36 | 43 | 0.837 | 0.537 | 1.5 | 68.5 | 70.0 | 72 |
| | 1244 | 15 | 5 | 7 | 0.714 | 0.537 | 1.5 | 68.5 | 70.0 | 20 |
| | 1640 | 15 | 4 | 6 | 0.667 | 0.537 | 1.5 | 68.5 | 70.0 | 16 |
| | 2115 | 15 | 9 | 9 | 1.000 | 0.537 | 1.5 | 68.5 | 70.0 | 36 |
| | 2313 | 31 | 42 | 42 | 1.000 | 0.537 | 1.5 | 68.5 | 70.0 | 81 |
| 04 Sep | 5 | 30 | 55 | 53 | 1.038 | 0.537 | 1.5 | 68.5 | 70.0 | 110 |
| | 102 | 30 | 73 | 62 | 1.177 | 0.537 | 1.5 | 68.5 | 70.0 | 146 |
| | 220 | 30 | 86 | 80 | 1.075 | 0.537 | 1.5 | 68.5 | 70.0 | 172 |
| | 315 | 30 | 72 | 65 | 1.108 | 0.537 | 1.5 | 68.5 | 70.0 | 144 |
| | 605 | 30 | 58 | 56 | 1.036 | 0.537 | 1.5 | 68.5 | 70.0 | 116 |
| | 1005 | 30 | 27 | 45 | 0.600 | 0.537 | 1.5 | 68.5 | 70.0 | 54 |
| | 1115 | 30 | 33 | 51 | 0.647 | 0.537 | 1.5 | 68.5 | 70.0 | 66 |
| | 1610 | 30 | 18 | 35 | 0.514 | 0.537 | 1.5 | 68.5 | 70.0 | 36 |
| | 2125 | 30 | 36 | 42 | 0.857 | 0.537 | 1.5 | 63.0 | 64.5 | 72 |
| | 2332 | 26 | 38 | 50 | 0.760 | 0.537 | 1.5 | 63.0 | 64.5 | 88 |
| 05 Sep | 128 | 30 | 80 | 84 | 0.952 | 0.537 | 1.5 | 60.0 | 61.5 | 160 |
| | 305 | 30 | 43 | 48 | 0.896 | 0.537 | 1.5 | 60.0 | 61.5 | 86 |
| | 620 | 30 | 33 | 30 | 1.100 | 0.537 | 1.5 | 60.0 | 61.5 | 66 |
| | 1115 | 30 | 28 | 28 | 1.000 | 0.537 | 1.5 | 60.0 | 61.5 | 56 |
| | 1608 | 30 | 28 | 26 | 1.077 | 0.537 | 1.5 | 60.0 | 61.5 | 56 |
| | 2218 | 30 | 67 | 63 | 1.063 | 0.437 | 3.0 | 55.0 | 58.0 | 134 |
| | 2314 | 30 | 79 | 57 | 1.386 | 0.437 | 3.0 | 55.0 | 58.0 | 158 |
| 06 Sep | 10 | 30 | 114 | 73 | 1.562 | 0.437 | 3.0 | 55.0 | 58.0 | 228 |
| | 45 | 10 | 45 | 40 | 1.125 | 0.300 | 3.0 | 55.0 | 58.0 | 270 |
| | 103 | 30 | 142 | 147 | 0.966 | 0.300 | 3.0 | 55.0 | 58.0 | 284 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 201 | 30 | 113 | 119 | 0.950 | 0.300 | 3.0 | 55.0 | 58.0 | 226 |
| | 301 | 30 | 103 | 125 | 0.824 | 0.300 | 3.0 | 55.0 | 58.0 | 206 |
| | 335 | 15 | 37 | 43 | 0.860 | 0.363 | 3.0 | 55.0 | 58.0 | 148 |
| | 627 | 30 | 53 | 70 | 0.757 | 0.363 | 3.0 | 55.0 | 58.0 | 106 |
| | 1110 | 30 | 71 | 106 | 0.670 | 0.363 | 3.0 | 55.0 | 58.0 | 142 |
| | 1145 | 10 | 19 | 16 | 1.188 | 0.541 | 3.0 | 55.0 | 58.0 | 114 |
| | 1605 | 30 | 52 | 37 | 1.405 | 0.541 | 3.0 | 55.0 | 58.0 | 104 |
| | 2130 | 30 | 39 | 27 | 1.444 | 0.541 | 3.0 | 55.0 | 58.0 | 78 |
| | 2207 | 30 | 38 | 35 | 1.086 | 0.377 | 3.0 | 55.0 | 58.0 | 76 |
| | 2330 | 30 | 133 | 136 | 0.978 | 0.377 | 3.0 | 55.0 | 58.0 | 266 |
| 07 Sep | 15 | 30 | 136 | 121 | 1.124 | 0.377 | 3.0 | 55.0 | 58.0 | 272 |
| | 310 | 30 | 150 | 137 | 1.095 | 0.377 | 3.0 | 55.0 | 58.0 | 300 |
| | 617 | 30 | 111 | 146 | 0.760 | 0.377 | 3.0 | 55.0 | 58.0 | 222 |
| | 648 | 10 | 36 | 33 | 1.091 | 0.495 | 3.0 | 55.0 | 58.0 | 216 |
| | 1105 | 35 | 103 | 43 | 2.395 | 0.495 | 3.0 | 55.0 | 58.0 | 177 |
| | 1210 | 30 | 64 | 82 | 0.780 | 0.204 | 3.0 | 55.0 | 58.0 | 128 |
| | 1245 | 14 | 20 | 17 | 1.176 | 0.250 | 3.0 | 55.0 | 58.0 | 86 |
| | 1608 | 30 | 54 | 48 | 1.125 | 0.250 | 3.0 | 55.0 | 58.0 | 108 |
| | 2111 | 30 | 125 | 130 | 0.962 | 0.250 | 3.0 | 55.0 | 58.0 | 250 |
| | 2306 | 30 | 80 | 69 | 1.159 | 0.250 | 3.0 | 55.0 | 58.0 | 160 |
| 08 Sep | 15 | 30 | 131 | 102 | 1.284 | 0.250 | 3.0 | 55.0 | 58.0 | 262 |
| | 310 | 30 | 122 | 117 | 1.043 | 0.250 | 3.0 | 55.0 | 58.0 | 244 |
| | 615 | 30 | 85 | 100 | 0.850 | 0.250 | 3.0 | 55.0 | 58.0 | 170 |
| | 1101 | 30 | 54 | 66 | 0.818 | 0.250 | 3.0 | 55.0 | 58.0 | 108 |
| | 1135 | 15 | 10 | 9 | 1.111 | 0.305 | 3.0 | 55.0 | 58.0 | 40 |
| | 1615 | 30 | 36 | 32 | 1.125 | 0.305 | 3.0 | 55.0 | 58.0 | 72 |
| | 2127 | 30 | 24 | 19 | 1.263 | 0.305 | 3.0 | 55.0 | 58.0 | 48 |
| | 2304 | 30 | 86 | 74 | 1.162 | 0.305 | 3.0 | 55.0 | 58.0 | 172 |
| 09 Sep | 10 | 30 | 160 | 132 | 1.212 | 0.305 | 3.0 | 55.0 | 58.0 | 320 |
| | 45 | 10 | 52 | 56 | 0.929 | 0.251 | 3.0 | 55.0 | 58.0 | 312 |
| | 310 | 30 | 159 | 148 | 1.074 | 0.251 | 3.0 | 55.0 | 58.0 | 318 |
| | 625 | 30 | 97 | 103 | 0.942 | 0.251 | 3.0 | 55.0 | 58.0 | 194 |
| | 1131 | 29 | 45 | 44 | 1.023 | 0.251 | 3.0 | 55.0 | 58.0 | 93 |
| | 1616 | 30 | 21 | 22 | 0.955 | 0.251 | 3.0 | 55.0 | 58.0 | 42 |
| | 2129 | 30 | 78 | 92 | 0.848 | 0.251 | 3.0 | 55.0 | 58.0 | 156 |
| 10 Sep | 1 | 30 | 92 | 107 | 0.860 | 0.251 | 3.0 | 55.0 | 58.0 | 184 |
| | 225 | 25 | 70 | 171 | 0.409 | 0.251 | 3.0 | 55.0 | 58.0 | 168 |
| | 301 | 30 | 74 | 75 | 0.987 | 0.612 | 3.0 | 55.0 | 58.0 | 148 |
| | 701 | 30 | 58 | 48 | 1.208 | 0.612 | 3.0 | 55.0 | 58.0 | 116 |
| | 735 | 15 | 37 | 39 | 0.949 | 0.506 | 3.0 | 55.0 | 58.0 | 148 |
| | 1115 | 30 | 76 | 77 | 0.987 | 0.506 | 3.0 | 55.0 | 58.0 | 152 |
| | 1620 | 30 | 46 | 42 | 1.095 | 0.506 | 3.0 | 55.0 | 58.0 | 92 |
| | 2105 | 30 | 89 | 101 | 0.881 | 0.506 | 3.0 | 55.0 | 58.0 | 178 |
| | 2305 | 30 | 101 | 287 | 0.352 | 0.506 | 3.0 | 55.0 | 58.0 | 202 |
| 11 Sep | 1 | 30 | 127 | 171 | 0.743 | 0.506 | 3.0 | 55.0 | 58.0 | 254 |
| | 305 | 30 | 101 | 214 | 0.472 | 0.506 | 3.0 | 55.0 | 58.0 | 202 |
| | 340 | 15 | 37 | 48 | 0.771 | 0.900 | 3.0 | 55.0 | 58.0 | 148 |
| | 624 | 25 | 124 | 261 | 0.475 | 0.900 | 3.0 | 55.0 | 58.0 | 298 |
| | 715 | 15 | 36 | 59 | 0.610 | 0.999 | 3.0 | 55.0 | 58.0 | 144 |
| | 1105 | 30 | 61 | 172 | 0.355 | 0.999 | 3.0 | 55.0 | 58.0 | 122 |
| | 1605 | 30 | 45 | 43 | 1.047 | 0.999 | 3.0 | 55.0 | 58.0 | 90 |
| | 2125 | 30 | 147 | 191 | 0.770 | 0.999 | 3.0 | 55.0 | 58.0 | 294 |
| | 2310 | 15 | 71 | 370 | 0.192 | 0.999 | 3.0 | 55.0 | 58.0 | 284 |
| 12 Sep | 5 | 30 | 150 | 210 | 0.714 | 0.999 | 3.0 | 60.0 | 63.0 | 300 |
| | 205 | 30 | 110 | 151 | 0.728 | 0.999 | 3.0 | 60.0 | 63.0 | 220 |
| | 330 | 15 | 43 | 98 | 0.439 | 0.999 | 3.0 | 60.0 | 63.0 | 172 |
| | 625 | 30 | 134 | 357 | 0.375 | 0.999 | 3.0 | 60.0 | 63.0 | 268 |
| | 705 | 15 | 80 | 135 | 0.593 | 0.999 | 3.0 | 60.0 | 63.0 | 320 |
| | 1110 | 30 | 77 | 245 | 0.314 | 0.999 | 3.0 | 60.0 | 63.0 | 154 |
| | 1221 | 15 | 61 | 136 | 0.449 | 0.999 | 3.0 | 60.0 | 63.0 | 244 |
| | 1625 | 30 | 100 | 145 | 0.690 | 0.999 | 3.0 | 50.0 | 53.0 | 200 |

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| Date | Time Start | Duration (min) | Scope Count | Sonar Count | Adjustment Factor [a] | PRR [b] | Dead Range | Counting Range | Total Range | Passage Rate (fish/hour) |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2129 | 30 | 86 | 97 | 0.887 | 0.999 | 3.0 | 50.0 | 53.0 | 172 |
| | 2315 | 30 | 30 | 31 | 0.968 | 0.999 | 3.0 | 50.0 | 53.0 | 60 |
| 13 Sep | 5 | 30 | 48 | 36 | 1.333 | 0.999 | 3.0 | 50.0 | 53.0 | 96 |
| | 305 | 40 | 44 | 31 | 1.419 | 0.999 | 3.0 | 50.0 | 53.0 | 66 |
| | 615 | 30 | 93 | 248 | 0.375 | 0.999 | 3.0 | 50.0 | 53.0 | 186 |
| | 1135 | 30 | 111 | 123 | 0.902 | 0.999 | 3.0 | 50.0 | 53.0 | 222 |
| | 1615 | 30 | 82 | 48 | 1.708 | 0.999 | 3.0 | 50.0 | 53.0 | 164 |
| | 1705 | 15 | 91 | 214 | 0.425 | 0.600 | 3.0 | 50.0 | 53.0 | 364 |
| | 2133 | 27 | 84 | 112 | 0.750 | 0.999 | 3.0 | 50.0 | 53.0 | 187 |
| | 2301 | 30 | 107 | 189 | 0.566 | 0.999 | 3.0 | 50.0 | 53.0 | 214 |
| 14 Sep | 10 | 30 | 64 | 214 | 0.299 | 0.999 | 3.0 | 50.0 | 53.0 | 128 |
| | 301 | 30 | 64 | 263 | 0.243 | 0.999 | 3.0 | 50.0 | 53.0 | 128 |
| | 615 | 30 | 197 | 550 | 0.358 | 0.999 | 3.0 | 50.0 | 53.0 | 394 |
| | 1110 | 30 | 92 | 221 | 0.416 | 0.999 | 3.0 | 50.0 | 53.0 | 184 |
| | 2120 | 30 | 264 | 400 | 0.660 | 0.999 | 3.0 | 50.0 | 53.0 | 528 |
| | 2302 | 30 | 147 | 581 | 0.253 | 0.999 | 3.0 | 50.0 | 53.0 | 294 |
| 15 Sep | 15 | 30 | 208 | 641 | 0.324 | 0.999 | 3.0 | 50.0 | 53.0 | 416 |
| | 305 | 30 | 150 | 600 | 0.250 | 0.999 | 3.0 | 50.0 | 53.0 | 300 |
| | 601 | 30 | 250 | 1,164 | 0.215 | 0.999 | 3.0 | 50.0 | 53.0 | 500 |
| | 1115 | 30 | 65 | 379 | 0.172 | 0.999 | 3.0 | 50.0 | 53.0 | 130 |
| | 1605 | 30 | 68 | 261 | 0.261 | 0.999 | 3.0 | 50.0 | 53.0 | 136 |
| | 2125 | 30 | 82 | 347 | 0.236 | 0.999 | 3.0 | 50.0 | 53.0 | 164 |
| | 2325 | 30 | 121 | 671 | 0.180 | 0.999 | 3.0 | 50.0 | 53.0 | 242 |
| 16 Sep | 20 | 30 | 93 | 191 | 0.487 | 0.999 | 3.0 | 50.0 | 53.0 | 186 |
| | 301 | 30 | 118 | 417 | 0.283 | 0.999 | 3.0 | 50.0 | 53.0 | 236 |
| | 625 | 30 | 103 | 715 | 0.144 | 0.999 | 3.0 | 50.0 | 53.0 | 206 |
| | 1105 | 30 | 19 | 54 | 0.352 | 0.999 | 3.0 | 50.0 | 53.0 | 38 |
| | 1615 | 30 | 74 | 367 | 0.202 | 0.999 | 3.0 | 50.0 | 53.0 | 148 |
| | 2102 | 30 | 22 | 32 | 0.688 | 0.999 | 3.0 | 50.0 | 53.0 | 44 |
| | 2305 | 30 | 71 | 455 | 0.156 | 0.999 | 3.0 | 50.0 | 53.0 | 142 |
| 17 Sep | 15 | 30 | 63 | 274 | 0.230 | 0.999 | 3.0 | 50.0 | 53.0 | 126 |
| | 301 | 30 | 104 | 783 | 0.133 | 0.999 | 3.0 | 50.0 | 53.0 | 208 |
| | 620 | 30 | 71 | 351 | 0.202 | 0.999 | 3.0 | 50.0 | 53.0 | 142 |
| | 1105 | 30 | 73 | 1,016 | 0.072 | 0.999 | 3.0 | 50.0 | 53.0 | 146 |
| | 1615 | 30 | 28 | 50 | 0.560 | 0.999 | 1.5 | 40.0 | 41.5 | 56 |
| | 2105 | 30 | 56 | 150 | 0.373 | 0.999 | 1.5 | 40.0 | 41.5 | 112 |
| | 2310 | 30 | 55 | 214 | 0.257 | 0.999 | 1.5 | 40.0 | 41.5 | 110 |
| 18 Sep | 2 | 30 | 54 | 138 | 0.391 | 0.999 | 1.5 | 40.0 | 41.5 | 108 |
| | 305 | 30 | 72 | 290 | 0.248 | 0.999 | 1.5 | 40.0 | 41.5 | 144 |
| | 620 | 30 | 71 | 637 | 0.111 | 0.999 | 1.5 | 40.0 | 41.5 | 142 |
| | 1115 | 30 | 39 | 141 | 0.277 | 0.999 | 1.5 | 40.0 | 41.5 | 78 |
| | 1617 | 30 | 28 | 106 | 0.264 | 0.999 | 1.5 | 40.0 | 41.5 | 56 |
| | 2125 | 30 | 63 | 279 | 0.226 | 0.999 | 1.5 | 40.0 | 41.5 | 126 |
| | 2329 | 30 | 73 | 612 | 0.119 | 0.999 | 1.5 | 40.0 | 41.5 | 146 |
| 19 Sep | 20 | 30 | 73 | 585 | 0.125 | 0.999 | 1.5 | 40.0 | 41.5 | 146 |
| | 301 | 30 | 72 | 936 | 0.077 | 0.999 | 1.5 | 40.0 | 41.5 | 144 |
| | 610 | 30 | 110 | 694 | 0.159 | 0.999 | 1.5 | 40.0 | 41.5 | 220 |
| | 1210 | 30 | 2 | 7 | 0.286 | 0.999 | 1.5 | 40.0 | 41.5 | 4 |
| | 1603 | 30 | 16 | 61 | 0.262 | 0.999 | 1.5 | 40.0 | 41.5 | 32 |
| | 2131 | 30 | 44 | 86 | 0.512 | 0.999 | 1.5 | 40.0 | 41.5 | 88 |
| | 2301 | 30 | 40 | 116 | 0.345 | 0.999 | 1.5 | 40.0 | 41.5 | 80 |
| 20 Sep | 20 | 30 | 38 | 178 | 0.213 | 0.999 | 1.5 | 40.0 | 41.5 | 76 |
| | 301 | 30 | 23 | 105 | 0.219 | 0.999 | 1.5 | 40.0 | 41.5 | 46 |
| | 620 | 30 | 16 | 39 | 0.410 | 0.999 | 1.5 | 40.0 | 41.5 | 32 |
| | 1103 | 30 | 18 | 33 | 0.545 | 0.999 | 1.5 | 40.0 | 41.5 | 36 |
| Total | 299 | 7,369 | 14,043 | 31,247 | 0.449 | | | | | |

[a] The "adjustment factor" is the oscilloscope count divided by the sonar count, and was used to adjust sonar counts.

[b] Pulse repetition rate of the sonar counter at start of calibration period. When the PRR was changed, that change is reflected in the PRR shown for the start of the next calibration period.

Appendix A.11. Percent of river width insonified by hydroacoustic beam at the Sheenjek River project site in 1988.

| Date | Sonar Dead Range (m) | Sonar Counting Range (m) | Total Range (m) | Number of Electronic Sectors | Sector Width (m) | Transducer Distance to Cutbank (m) | River Width (m) | Uninsonified Zone (m) | Percent of River Width Insonified | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1985 ctr | 1977 ctr |
| 21 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 45.7 | 56.7 | 14.5 | | 74% |
| 22 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 44.8 | 52.1 | 13.6 | | 74% |
| 23 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 44.8 | 52.1 | 13.6 | | 74% |
| 24 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 44.8 | 52.1 | 13.6 | | 74% |
| 25 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 52.1 | 62.2 | 20.9 | | 66% |
| 26 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 49.7 | 62.2 | 18.4 | | 70% |
| 27 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 49.7 | 62.2 | 18.4 | | 70% |
| 28 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 49.7 | 62.2 | 18.4 | | 70% |
| 29 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 49.7 | 62.2 | 18.4 | | 70% |
| 30 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 49.7 | 62.2 | 18.4 | | 70% |
| 31 Aug | 0.8 | 30.5 | 31.2 | 12 | 2.5 | 49.7 | 62.2 | 18.4 | | 70% |
| 01 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 46.9 | 62.2 | 2.4 | 96% | |
| 02 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 46.9 | 62.2 | 2.4 | 96% | |
| 03 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 46.9 | 62.2 | 2.4 | 96% | |
| 04 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 46.9 | 62.2 | 2.4 | 96% | |
| 05 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 50.3 | 65.5 | 5.8 | 91% | |
| 06 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 50.3 | 65.5 | 5.8 | 91% | |
| 07 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 50.3 | 65.5 | 5.8 | 91% | |
| 08 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 68.9 | 87.2 | 24.4 | 72% | |
| 09 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 65.8 | 87.2 | 21.3 | 76% | |
| 10 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 62.2 | 87.2 | 17.7 | 80% | |
| 11 Sep | 0.3 | 44.2 | 44.5 | 16 | 2.8 | 58.8 | 87.2 | 14.3 | 84% | |
| 12 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 54.9 | 87.2 | 13.0 | 85% | |
| 13 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 54.9 | 87.2 | 13.0 | 85% | |
| 14 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 54.9 | 87.2 | 13.0 | 85% | |
| 15 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 50.6 | 67.1 | 8.7 | 87% | |
| 16 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 50.6 | 67.1 | 8.7 | 87% | |
| 17 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 50.6 | 67.1 | 8.7 | 87% | |
| 18 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 50.6 | 67.1 | 8.7 | 87% | |
| 19 Sep | 0.8 | 41.1 | 41.9 | 16 | 2.6 | 50.6 | 67.1 | 8.7 | 87% | |
| 20 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| 21 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| 22 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| 23 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| 24 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| 25 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| 26 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| 27 Sep | 0.3 | 39.9 | 40.2 | 16 | 2.5 | 47.9 | 67.1 | 7.6 | 89% | |
| Average | | | | | | 50.7 | 68.1 | 11.4 | 88% | 71% |

Appendix A.12. Percent of river width insonified by hydroacoustic beam at the Sheenjek River project site in 1989.

| Date | Sonar Dead Range (m) | Sonar Counting Range (m) | Total Range (m) | Number of Electronic Sectors | Sector Width (m) | Transducer Distance to Cutbank (m) | River Width (m) | Uninsonified Zone (m) | Percent of River Width Insonified 1977 ctr |
|---|---|---|---|---|---|---|---|---|---|
| 22 Aug | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 50.0 | 63.4 | 21.9 | 65% |
| 23 Aug | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 60.4 | 74.4 | 32.3 | 57% |
| 24 Aug | 0.8 | 27.4 | 28.2 | 12 | 2.3 | 55.2 | 72.5 | 27.1 | 63% |
| 25 Aug | 0.8 | 27.4 | 28.2 | 12 | 2.3 | 55.2 | 72.5 | 27.1 | 63% |
| 26 Aug | 0.8 | 27.4 | 28.2 | 12 | 2.3 | 55.2 | 72.5 | 27.1 | 63% |
| 27 Aug | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 28 Aug | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 29 Aug | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 30 Aug | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 31 Aug | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 01 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 02 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 03 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 04 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 48.5 | 67.4 | 20.1 | 70% |
| 05 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 53.9 | 68.0 | 25.6 | 62% |
| 06 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 53.9 | 68.0 | 25.6 | 62% |
| 07 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 53.9 | 68.0 | 25.6 | 62% |
| 08 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 53.9 | 68.0 | 25.6 | 62% |
| 09 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 53.9 | 68.0 | 25.6 | 62% |
| 10 Sep | 0.9 | 27.4 | 28.3 | 12 | 2.3 | 51.2 | 67.4 | 22.9 | 66% |
| 11 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 50.0 | 65.2 | 21.9 | 66% |
| 12 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 50.0 | 65.2 | 21.9 | 66% |
| 13 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 50.0 | 65.2 | 21.9 | 66% |
| 14 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 47.2 | 62.5 | 19.2 | 69% |
| 15 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 47.2 | 62.5 | 19.2 | 69% |
| 16 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 47.2 | 62.5 | 19.2 | 69% |
| 17 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 47.2 | 62.5 | 19.2 | 69% |
| 18 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 49.7 | 57.9 | 21.6 | 63% |
| 19 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 49.7 | 57.9 | 21.6 | 63% |
| 20 Sep | 0.6 | 27.4 | 28.0 | 12 | 2.3 | 49.7 | 57.9 | 21.6 | 63% |
| 21 Sep | 1.8 | 27.4 | 29.3 | 12 | 2.3 | 41.5 | 54.6 | 12.2 | 78% |
| 22 Sep | 1.8 | 27.4 | 29.3 | 12 | 2.3 | 41.5 | 54.6 | 12.2 | 78% |
| 23 Sep | 1.8 | 27.4 | 29.3 | 12 | 2.3 | 41.5 | 54.6 | 12.2 | 78% |
| 24 Sep | 1.8 | 27.4 | 29.3 | 12 | 2.3 | 41.5 | 54.6 | 12.2 | 78% |
| Average | | | | | | 49.6 | 64.9 | 21.3 | 67% |

Appendix A.13. Percent of river width insonified by hydroacoustic beam at the Sheenjek River project site in 1990.

| Date | Sonar Dead Range (m) | Sonar Counting Range (m) | Total Range (m) | Number of Electronic Sectors | Sector Width (m) | Transducer Distance to Cutbank (m) | River Width (m) | Uninsonified Zone (m) | Percent of River Width Insonified 1981 ctr |
|---|---|---|---|---|---|---|---|---|---|
| 22 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 23 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 24 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 25 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 26 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 27 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 28 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 29 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 30 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 31 Aug | 0.6 | 32.9 | 33.5 | 16 | 2.1 | 40.2 | 50.3 | 6.7 | 87% |
| 01 Sep | 1.2 | 35.1 | 36.3 | 16 | 2.2 | 41.1 | 51.8 | 4.9 | 91% |
| 02 Sep | 1.2 | 35.1 | 36.3 | 16 | 2.2 | 41.1 | 51.8 | 4.9 | 91% |
| 03 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 04 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 05 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 06 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 07 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 08 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 09 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 10 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 11 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 12 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 13 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 14 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 15 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 16 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 17 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 18 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 19 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 20 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 21 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 22 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 23 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 24 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 25 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 26 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 27 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| 28 Sep | 0.6 | 34.1 | 34.7 | 16 | 2.1 | 41.1 | 51.8 | 6.4 | 88% |
| Average | | | | | | 40.9 | 51.4 | 6.4 | 67% |

Appendix A.14. Percent of river width insonified by hydroacoustic beam at the Sheenjek River project site in 1991.

| Date | Sonar Dead Range (m) | Sonar Counting Range (m) | Total Range (m) | Number of Electronic Sectors | Sector Width (m) | Transducer Distance to Cutbank (m) | River Width (m) | Uninsonified Zone (m) | Percent of River Width Insonified 1977 ctr |
|---|---|---|---|---|---|---|---|---|---|
| 09 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 49.1 | 61.3 | 21.2 | 65% |
| 10 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 49.1 | 61.3 | 21.2 | 65% |
| 11 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 46.0 | 58.2 | 18.1 | 69% |
| 12 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 46.0 | 58.2 | 18.1 | 69% |
| 13 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 46.0 | 58.2 | 18.1 | 69% |
| 14 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 43.3 | 54.6 | 15.4 | 72% |
| 15 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 43.3 | 54.6 | 15.4 | 72% |
| 16 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 43.3 | 54.6 | 15.4 | 72% |
| 17 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 43.3 | 54.6 | 15.4 | 72% |
| 18 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 43.3 | 54.6 | 15.4 | 72% |
| 19 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 43.3 | 54.6 | 15.4 | 72% |
| 20 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 21 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 22 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 23 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 24 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 25 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 26 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 27 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 28 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 29 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 30 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 31 Aug | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 01 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 02 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 40.8 | 51.8 | 13.0 | 75% |
| 03 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 04 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 05 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 06 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 07 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 08 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 09 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 10 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 11 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 12 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 13 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 14 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 15 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 16 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 17 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 18 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 19 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 20 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 21 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 22 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 23 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| 24 Sep | 0.5 | 27.4 | 27.9 | 12 | 2.3 | 39.6 | 46.9 | 11.7 | 75% |
| Average | | | | | | 41.1 | 50.5 | 13.2 | 74% |

Appendix A.15. Percent of river width insonified by hydroacoustic beam at the Sheenjek River project site in 1992.

| Date | Sonar Dead Range (m) | Sonar Counting Range (m) | Total Range (m) | Number of Electronic Sectors | Sector Width (m) | Transducer Distance to Cutbank (m) | River Width (m) | Uninsonified Zone (m) | Percent of River Width Insonified 1977 ctr |
|---|---|---|---|---|---|---|---|---|---|
| 09 Aug [a] | | | | 12 | | | 59.4 | | |
| 10 Aug [a] | | | | 12 | | | 59.4 | | |
| 11 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 12 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 13 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 14 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 15 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 16 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 17 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 18 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 19 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 20 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 21 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 22 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 23 Aug | 0.6 | 30.0 | 30.6 | 12 | 2.5 | 47.2 | 59.4 | 16.6 | 72% |
| 24 Aug | 0.9 | 19.8 | 20.7 | 12 | 1.7 | 43.0 | 47.2 | 22.3 | 53% |
| 25 Aug | 0.9 | 19.8 | 20.7 | 12 | 1.7 | 43.0 | 47.2 | 22.3 | 53% |
| 26 Aug | 0.9 | 19.8 | 20.7 | 12 | 1.7 | 43.0 | 47.2 | 22.3 | 53% |
| 27 Aug | 0.9 | 19.8 | 20.7 | 12 | 1.7 | 43.0 | 47.2 | 22.3 | 53% |
| 28 Aug | 0.9 | 19.8 | 20.7 | 12 | 1.7 | 43.0 | 47.2 | 22.3 | 53% |
| 29 Aug | 0.9 | 19.8 | 20.7 | 12 | 1.7 | 43.0 | 47.2 | 22.3 | 53% |
| 30 Aug | 0.9 | 18.3 | 19.2 | 12 | 1.5 | 50.0 | 73.2 | 30.8 | 58% |
| 31 Aug | 0.9 | 18.3 | 19.2 | 12 | 1.5 | 50.0 | 73.2 | 30.8 | 58% |
| 01 Sep | 0.9 | 18.3 | 19.2 | 12 | 1.5 | 50.0 | 73.2 | 30.8 | 58% |
| 02 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 03 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 04 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 05 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 06 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 07 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 08 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 09 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 10 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 11 Sep | 0.5 | 18.0 | 18.4 | 12 | 1.5 | 46.0 | 73.2 | 27.6 | 62% |
| 12 Sep | 0.9 | 15.2 | 16.2 | 12 | 1.3 | 43.0 | 58.2 | 26.8 | 54% |
| 13 Sep | 0.9 | 15.2 | 16.2 | 12 | 1.3 | 43.0 | 58.2 | 26.8 | 54% |
| 14 Sep | 0.9 | 15.2 | 16.2 | 12 | 1.3 | 43.0 | 58.2 | 26.8 | 54% |
| 15 Sep | 0.9 | 15.2 | 16.2 | 12 | 1.3 | 43.0 | 58.2 | 26.8 | 54% |
| 16 Sep | 0.9 | 15.2 | 16.2 | 12 | 1.3 | 43.0 | 58.2 | 26.8 | 54% |
| 17 Sep | 0.5 | 12.2 | 12.6 | 12 | 1.0 | 39.9 | 53.3 | 27.3 | 49% |
| 18 Sep | 0.5 | 12.2 | 12.6 | 12 | 1.0 | 39.9 | 53.3 | 27.3 | 49% |
| 19 Sep | 0.5 | 12.2 | 12.6 | 12 | 1.0 | 39.9 | 53.3 | 27.3 | 49% |
| 20 Sep | 0.5 | 12.2 | 12.6 | 12 | 1.0 | 39.9 | 53.3 | 27.3 | 49% |
| Average | | | | | | 45.3 | 61.3 | 23.4 | 61% |

[a] The various parameters changed several times each day on 9 and 10 August as a result of repositioning the transducer.